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THE ELEMENTARY SCHOOL TEACHER AND COURSE OF STUDY

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NATURAL SCIENCE.

WILBUR S. JACKMAN.

SOME APPLICATIONS OF NUMBER WORK TO NATURE STUDY.

EVERY observation is made and repeated for the purpose of defining a picture or image. Number work is a means of defining a picture or image through a determination of quantity. In the application of number, therefore, the same principles must be observed that are employed in defining the image by other means.

1. There must be a clear conception of the image to be developed. Number work, not less than drawing, painting, modeling, and written composition, depends upon the primary conception.

2. There must be a careful selection of appropriate units of measurement. The units chosen should be such as will involve the pupils least in the details of process, and which, at the same time, will best approximately define the image.

3. The most expeditious methods of measurement, or of applying the units, should be adopted. Estimate first; then measure. Neglect the fractions that are inessential to that general approximation which is within reach of the pupil's ability to image.

4. There must be a careful selection of processes by which the comparisons are made. This will be determined by the

pupil's ability to picture the different standards of comparison. The earliest processes will be simple addition and subtraction; then the use of fractions; later, ratio; then percentage.

5. The results obtained must be represented objectively. Gallons, quarts, pints, feet, yards, square feet, square yards, acres, miles, etc., must be seen until they become a part of the mental equipment, just as, for example, an idea of the color green is always at hand and ready for use. Proportions should be represented by diagrams and models.

6. Using the results obtained as data, a great nature picture must be constructed; that is, through the original and primary conception under which the pupil has been working, the real magnitude of world operations should be made to appear.

In the eighth grade, number work, planned in accordance with the foregoing, is being applied to several aspects of nature.

I. THE DISPERSAL OF SEEDS.

An attempt is made to form some idea of the rate at which plants might multiply, as indicated by the seed production.

1. Near the schoolhouse a vacant city block rather thickly covered with wild verbenas was selected for study.

2. By measurement and calculations this area was found to contain approximately one-fourth of an acre.

3. Areas of one square yard each were measured in various places, and the average number of plants was calculated.

4. An average of thirty plants per square yard gave approximately 36,000 to the quarter acre.

5. Each seed pod contained four seeds, one of which, on the average, it was found, failed to mature. The number of pods on a spike was counted, which, when multiplied by the number of spikes, gave 2,300 seeds as the average number produced by each plant. Since only three-fourths of the total number matured, each plant furnished, therefore, (approximately) 1,700 good seeds available for growth.

6. If these good seeds were properly distributed, and if each were to produce a plant, the one-fourth of an acre the second season could populate 425 acres—approximately two-thirds of a square mile, *i. e.*, equal to an area bounded by Cottage Grove avenue and State street on the east and west, and Sixty-third and Fifty-fifth streets on the north and south.

The third season, under the same suppositions, enough seeds would be furnished to populate 1,122 square miles, *i. e.*, more than six times the area of Chicago.

The fourth season, under the same suppositions, the area populated would be 1,907,400 square miles, *i. e.*, equal to about thirty-four times the area of Illinois.

The fifth year the number of seeds would be sufficient to furnish plants as thickly as those found on the quarter of an acre for an area equal to sixteen times that of the entire earth.

These measurements and calculations give (*a*) an idea of the vitality and the tremendous push and rush of the living thing; (*b*) since there is no such increase, as an actual fact, they indicate the degree of failure on the part of the plant to get its seeds properly scattered and safely planted, and also the enormous resistance offered by other plants and climatic agencies to the growth and spread of the verbena.

II. SEASONAL CONDITIONS: WERE THEY FAVORABLE OR UNFAVORABLE?

1. Rainfall: One inch of rainfall furnishes 540 barrels of water per acre, or 135 barrels for the quarter acre. During the months of May, June, July, August, and September, where the verbenas grew, the rainfall due the plants, according to the thirty-years' average given by the Weather Bureau, is 16.1 inches, or 2,229 barrels. The actual rainfall for three months in 1901 was 13.9 inches, or 1,874 barrels. There was, therefore, a shortage of 2.6 inches, or 355 barrels. That is, from this cause alone the vitality of the plants was reduced by about 16 per cent. This may be viewed in different ways: (*a*) that only about eight plants out of ten would grow this season; or (*b*) that eight seeds out of ten would mature; or (*c*) that the general vitality was lowered, which would be felt the following season.

2. Sunshine: The Weather Bureau records for the past eight years show that this region has received 65 per cent. of the sunshine possible during the months under consideration. In the year 1901 this area received 68 per cent. of the possible sunshine. It follows therefore that, since plants are most active in sunshine, there was an overstimulation of 3 per cent. above the normal. Since, also, during sunshine plants are most active in the transpiration of water, and since there was a shortage in the supply of 16 per cent., it follows that the combination of these two causes operated to intensify the strain upon the plant. The plant endeavors to resist this strain by reducing the leaf surface exposed to the sunshine.

3. Temperature: The average temperature for the five months for thirty-one years is 66 degrees. For the year 1901 the average temperature for the same month is 68 degrees. There was actually, however, an excess of 6 degrees during this time, as shown by the Weather Bureau records. This condition meant, also, not only a possible increase of plant activity; it meant more than the normal evaporation from the soil which would tend to cut off the water supply from the plant.

4. Variation in intensity of sunshine: On the 21st of each month the *distribution* of a given beam of sunshine at noon is proportional to the following

areas: May, 108; June, 105; July, 107; August, 115. These results are obtained approximately by the use of the skiameter. The *intensity* of the sunshine varies inversely with the areas of distribution. In the month of June, when the intensity of sunshine is greatest, the average cloudiness is 32 per cent.; in 1901 the average cloudiness was 31 per cent. Therefore, the withdrawal of the friendly cloud shelter by the amount of 1 per cent. in the month when the intensity was greatest served still further to increase the tress laid upon the plant in the year 1901.

These causes all happened to combine directly in this particular year to menace the future of the verbena. They also operated indirectly, so far as they favor other plants that know how to get along with the reduced amount of moisture and the increased amount of sunshine and heat.

The botany of the verbena, therefore, becomes chiefly a study of the various devices of leaf, stem, and root by which this plant is able to maintain itself against all these unfavorable influences, which the work in number shows to be actual and definite forces of enormous power.

GEOGRAPHY.

ZONIA BABER.

OUTLINE FOR ELEMENTARY SCHOOL.

(CONTINUED FROM NOVEMBER.)

WITH increase of knowledge, the necessity of a closer and more complete classification of facts is apparent. But, while the value of the cataloguing of information under the heads of history, literature, science, mathematics, art, etc., is admitted, its unwholesome reaction on pedagogy must also be confessed. The inseparable relation of the subjects, the interdependence of one upon the other, has been overlooked. The instructor has, for instance, tried to teach history from material within the covers of a book labeled by the historian, without recognizing the fact that appreciation of the behavior of men and nations in the past is absolutely dependent upon, and inseparable from, that knowledge which the geographer has classified under another head.

The understanding of geographic facts necessitates a knowledge of science, mathematics, and history, and demands expression in reading, writing, modeling, drawing, painting, and making.

In the course in geography outlined for the elementary

school, certain phases of a subject under consideration may properly belong to history, science; mathematics, or art; but whatever has seemed essential is either outlined here or suggested without, perhaps, attaching the proper label.

Where the work is repeated in two or more grades, the material is new to each grade, or different aspects of the subject are considered.

FOURTH GRADE.

The geography of the world, beyond the environment of the fourth-grade pupils, will be approached through the children's interest in the industries which they see pursued about them, and through the products resulting from other kinds of labor not followed in this region.

During the autumn, opportunity was offered for the consideration of life in relation to the physiography of the Chicago region, through excursions to the ravine-cut lake bluff north of the city; to a farm; to the Blue Island ridge; to the clay pit at Purrington; and to a swamp. The pupils observed the means that man employs in the utilization of the forces and forms in nature for his best welfare; for instance, in the construction of piers along the lakeshore to prevent the wearing away of the land, and to induce a deposition of sand; in the use of ravines for highways to the lake; in the avoidance, for the sake of economy, of bridging ravines for railroads; in the natural and artificial drainage of swamps, and their adaptation for tillage; in the plowing of level or slightly sloping ground, leaving the steep slope to be covered by trees; in the treatment of sandy, rocky, clayey, and loamy soils for farming or gardening. All this predicated, of course, a knowledge of natural law.

During the cold months, excursions will be made to the Field Columbian Museum, the Art Institute, the conservatory in Washington Park, the zoölogical garden in Lincoln Park, and to certain manufactories. In the spring visits will be made to Dune Park for sand-dune phenomenon, and to the Desplaines river and the Chicago river.

I. ANIMALS AND THEIR HABITAT.

The interest in animals and their habits, in hunting, trapping, and fishing, is strong in the child as well as in the adult. At this season the desire for warm clothing gives an especial interest to the study of furs and fur-bearing animals. Tracing these animals to their homes may reveal the necessity for warm covering, and show their adaptation to their physical environment.

It is not expected that all the animals referred to below will be studied in detail, but one may stand as a type of a certain group in a similar environment. To illustrate: A tiger hunt with elephants in India may reveal the life, both plant and animal, of a tropic jungle. The story of the life of a

seal must include its friends and foes — the bear, the walrus, fish, man, icebergs, snow, rocky islands, the long summer day, and the long winter night. A bear hunt in the Rocky Mountains will require a knowledge of the associations of the bear. In the study of fish and fishing a knowledge of rivers, lakes, and sea is demanded. It is hoped that later a fish hatchery may be established in the school, and that, by the tending of the hatchery and by trips to fish markets, a vital interest in the life-history of fish may be created.

The entire earth might be pictured in this way; for animal life of some kind is found in all parts of the world, segregated where food is abundant and the climate congenial. Animals for food, clothing, or decoration may be studied: (1) at the Stock Yards — horses, cattle, sheep, hogs, goats; (2) in Lincoln Park — wild animals, as elephant, lion, tiger; (3) in South Water street — game of all kinds; (4) at fish markets — sea products; (5) at the tannery and the fur and millinery stores — products for decoration and clothing; (6) at the Field Columbian Museum — stuffed specimens of all kinds. By the use of stereopticon and other pictures, the habits and habitat of animals may be illustrated.

(1) Note all the animals you know within your environment. (2) Form: adaptation to locomotion; to means of procuring food. (3) Color. (4) Food: range of diet, means of locating and procuring. (5) Effect of change of climate on wild animals: (*a*) migration: (α) aids to land migration — valleys, plains; (β) obstructions to land migration — mountains, deserts, large bodies of water; (γ) obstructions to water migration — temperature, deep sea; (*b*) burrowing; (*c*) hibernation, estivation. (6) Relation of domestic animals to climate; shelter, food, use. (7) Wild animals that do not migrate, hibernate, or burrow. (8) Animals used by man for food: (*a*) fish, oysters, lobsters, crabs; where abundant; manner of catching — cormorant fish in Japan, fishing by torch in Hawaii, weirs, seines, hook and line, lobster pots, oyster fishing; (*b*) game: hunting, trapping; game most highly prized in our markets; how obtained; (*c*) domestic animals — cattle, sheep, hogs, poultry. (9) Animals used for clothing: (*a*) skins for leather — cattle, sheep, goat, alligator, kangaroo, deer; how prepared; (*b*) for fur — seal, beaver, sable, otter, ermine; (*c*) for hair — goat, yak, llama, camel, tiger; (*d*) feather — ducks, geese, ostriches, eagles, in fact almost all birds; how obtained. (10) Animals used as beasts of burden: horse, mule, cow, buffalo, elephant, camel, dog, llama, reindeer. (11) Animals not used by man for food, clothing, burden, bearing: home, habit, use. (12) Relation of animals to soil: (*a*) burrowing — earthworm, mole, crayfish; (*b*) musk-rat, beaver, hog; (*c*) birds. (13) Relation of animals to vegetation: forests, prairies, deserts, and semi-deserts. (14) Æsthetic value of animals: (*a*) why wild animals play so small a part in our landscape; (*b*) their abundance in Burmah and India. (15) Ethical aspect of man's relation to animals: (*a*) destruction of birds for use in millinery; (*b*) hunting for sport; (*c*) treatment of beasts of burden; of animals

used for clothing, for food; the necessity of societies for prevention of cruelty to animals.

Model in clay, paint, and draw certain animals seen at Lincoln Park and elsewhere. Represent animals in native habitat.

REFERENCES: Seton Thompson, *Some Wild Animals I Have Known;* Kipling, *Jungle Books;* Thomsen, *Study of Animal Life;* Jordan, *Animal Life;* Lubbock, *Beauties of Nature;* Mill, *Realm of Nature;* J. G. Woods, *Common Objects of the Country;* Wallace, *Distribution of Animals* and *Island Life;* Heilprin, *Distribution of Animals;* Drummond, *Tropical Africa;* Bates, *Naturalist on the Amazon;* Kingsley, *Water Babies;* John Burrough, *Squirrels and Other Fur Bearers; Wake Robin; Winter Sunshine; Fresh Fields; Birds and Poets;* Wood, *Natural History;* S. W. Baker, *Wild Beasts and Their Ways; Reminiscences of Europe, Asia, Africa, and America.*

II. METALS AND MINING.

The work that the pupils are doing in metals leads them to the mines as the source of supply of metals.

Visit a foundry, the economic geology department, Field Columbian Museum. Description of placer mining in Alaska; of a quartz mine. Account for concentration of metal which makes mining possible.

CRYSTALLIZATION.

All of the minerals and metals of the earth tend to crystallize.

Visit Field Columbia Museum.

Solution and crystallization: (1) Observation of crystals: (*a*) at home — sugar, salt, soda, etc.; (*b*) out-of-doors — snow, ice; (*c*) in drug stores — alum, blue vitriol, bichromate of potash, copperas, etc.; (*d*) in museum — quartz, calcite, copper, fourite, galena, etc. Note differences in form, color, size of crystals of same mineral; of different minerals. (2) Solution (try to dissolve different solids, as sugar, salt, alum, rocks): (*a*) in cold water; (*b*) in cold water plus acid; (*c*) in hot water; (*d*) in hot water plus acid; (*e*) in a saturated solution, as of sugar; try to dissolve salt, blue vitriol, etc. (3) Crystallization: (*a*) from saturated solution of salt, sugar, alum, blue vitriol, copperas, saltpeter, and bichromate of potash, allow crystals to form; (*b*) make mixed solution of blue vitriol, alum, etc., and allow to crystallize; (*c*) put coloring matter into a saturated solution, and note effect on crystals; (*d*) allow different solutions of salt, alum, copperas, etc., to evaporate, and note result; (*e*) mold and paint crystals of different forms and colors.

REFERENCES: "The Donkey and the Salt," *Æsop's Fables,* stories; F. D. Shenna, "Wizard Frost," poem; Dana, *Crystallography;* Dana, *Minerals and How to Study Them;* Tarr, *Elementary Geology;* Scott, *Introduction to Geology;* Ruskin, *Ethics of the Dust;* Geikie, *Text-Book of Geology;* Shaler, "Minerals and Mining," *United States of America,* p. 485.

III. TRANSPORTATION.

The children's interest in boats, trains, and means of obtaining foreign products will lead to the study of transportation. Visit shipyard, Pullman

car works, Field Columbian Museum, for modes of transportation, present and historical; Chicago river—a commercial highway.

I. Transportation by water: (1) seas and lakes—harbors, docks, lighthouses, freight and passenger boats; (2) rivers—boats seen on Chicago river; (3) canals, with locks and without locks.

II. Transportation by railroad: cars—freight, box, flat, refrigerator; Pullman and passenger coaches.

III. Telegraphs, cables, telephones, in connection with transportation; laying of cables.

IV. Beasts of burden: (1) horse, mule, cow, llama, buffalo, elephant, camel, donkey, dog, reindeer, man; (2) how used? in what countries? why used?

V. Vehicles drawn by animals: wagons, sleds, carriages.

REFERENCES: T. M. Cooley, *Transportation;* Shaler, *United States of America;* "Transportation Question," *Scribner's*, Vol. XVI, p. 687; "History of Canals," *Knight's American Dictionary*, Vol. I, p. 436; J. A. Satcha, "Cheap Transportation in the United States," *North American Review*, January–June, 1897; "Ship Canals," *Living Age*, Vol. CLXXXIV, p. 516; Adams, "Transportation," *Commercial Geography*, p. 39; "Transportation by Railway and Ship Canal," *Harper's*, Vol. LX, p. 577; L. M. Shaler, "Beasts of Burden," *Scribner's*, July–December, 1894, p. 82; "Roads, Streets, and Vehicles," *Iconographic Dictionary*, p. 149; "Canals," *ibid.*, p. 312; H. G. Prout, "Railroads," *United States of America;* "History of Railroads," *Iconographic Dictionary*, p. 170; "Telegraphs and Telephones," *ibid.*, p. 344; Shaler, *Land and Sea; Formation and Preservation of Harbors*, pp. 187, 223.

IV. FORESTS.

Through the work in wood in the sloyd shop, visits to car factory and furniture manufactories, interest in the source of wood supply will lead to a study of forests. Visit Washington Park conservatory for tropical vegetation.

I. Kinds of trees in this region seen in parks and on trips to country: (1) changes in appearance due to season; loss of leaves or bark; (2) varieties used for lumber; the properties that give commercial value.

II. Use of forests: (1) to animals—shelter, food, protection; (2) to soil—fallen leaves enrich soil; roots hold soil in place; roots and leaves retain moisture.

III. Forests on plains and on mountains: (1) kinds of forests: (*a*) tropical—summer and winter appearance; varieties of wood we use from tropic; (*b*) temperate—seasonal appearance; varieties in this region; use; (*c*) frigid—seasonal appearance; varieties; woods we use. (2) Deforestation: by fire, by man, by grazing of animals; effect upon (*a*) soil; (*b*) rivers; (*c*) vegetation; (*d*) civilization. (3) Planting of forests: (*a*) location; (*b*) method; (*c*) kind of trees. (4) Care of forests.

REFERENCES: Marsh, "The Woods," *Man and Nature*, pp. 57 and 128; *Encyclopedia Britannica* (see index); Andrews, *Louise, the Child of the Western Forest*, 1861, pp. 121–37; Eggleston, "The Value of Our Trees," *Popular Science*

Monthly, 1881, Vol. XIX; Lubbock, *Beauties of Nature*, p. 179; Marsh, *The Earth* (see index under "Wood"); Mill, *The Realm of Nature;* Oswald, "The Climatic Influence by Vegetation," *Popular Science Monthly*, 1872, Vol. I, pp. 385–90; Shaler, *Aspects of the Earth*, 1890, pp. 257–99; Shaler, *Story of Our Continent*, 1892 (see index under "Forest"); Stanley, *In Darkest Africa*, 1878 (see index under "Wood"); Smith, *Brazil*, 1879, pp. 176–204; Somers, "Forests of the California Coast Range," *Harper's*, Vol. LXXIX, pp. 652–60.

V. FARMING.

Visit a farm where plowing, planting, and other farm activities can be seen.

I. Products the farm gives to the city (visit grocery store and Stock Yards): (1) vegetables — radishes, cabbages, onions, potatoes, lettuce, etc.; (2) grains — wheat, oats, corn, rye, buckwheat; (3) animals — cattle, horses, sheep, goats, poultry, eggs, butter; (4) fruit — apples, peaches, pears, grapes, plums, berries; (5) food products from tropical farms — oranges, lemons, dates, etc.; (6) cultivation of products — use of plowing, harrowing, weeding, fertilizing; (*a*) machinery used in farming; (*b*) implements used by primitive people in cultivating the soil; (*c*) animals used in farm work; how tended; (*d*) animals used by Asiatic farmers which we do not use, as camel, water-buffalo.

II. The school garden.

The pupils will aid, as far as possible, in the preparation and planting of the school garden. (1) Plant common vegetables; grains, as wheat, corn, oats, rye, barley, rice, cotton, flax, tobacco, sugar-cane.[1] (2) Difference between cultivated and uncultivated areas. (3) Allow weeds to grow in a small part of the garden, and note the effect upon the vegetables. Let the soil remain hard around some plants and loose around others; note result. (4) Soil: loamy, sandy, or clayey. Plant same kind of seed in each kind of soil, irrigating equally; note result. (5) Relation of rainfall to amount of moisture needed by the garden. How to irrigate the garden. Pupils will work out different plans for irrigation, on flat, slightly sloping, and steep sloping ground, by flooding; by basins or checks; by furrows and ditches, in place of checks; by furrows run in parallel systems. (*a*) Source of water supply, here; source of water supply in regions where irrigation is imperative; wells, rivers, catch-basins; (*b*) value of irrigation to vegetation: temperature, material deposited, material dissolved. Stories of Egyptian irrigation by the aid of shâdûf, or kind of sweep, in lifting water from the Nile; by the saqiya, or waterwheel. (6) Relations of animals to garden plants: (*a*) those which do not injure the plants; (*b*) those which do injure the plants; (*c*) how prevent unfriendly visitors. (7) When should the garden be harvested? (*a*) plants used while immature; (*b*) plants allowed to mature.[2]

[1] Although cotton and sugar-cane may not mature before frost, the pupils will gain a knowledge of the growing plant. By use of pictures and descriptions the mature crop and the mode of harvesting may be shown.

[2] Pupils will prepare for lunch such vegetables as are ready for use before school closes.

III. Customs and superstitions in regard to certain products, as rice, wheat, and corn: rice, for instance, has been planted yearly by the emperors of China since 2500 B. C.; it is used in sacrifice to appease deity during eclipse, and in exchange of compliments in oriental diplomatic circles.

REFERENCES: Gaye, *World's Great Farm;* Illinois Department of Agriculture, *Transactions*, Vols. XII, XVI, XX, XXIV, XXVII; *Illinois Farmers' Institutes*, Vols. I, II, III; Ratzel, "Agriculture and Cattle Breeding," *History of Mankind* (1896), Vol. I, pp. 87–93; Storer, *Agriculture in Some of its Relations with Chemistry;* "Growth of Industrial Arts," United States, *House Miscellaneous Documents* (1892), Vol. XXX; King, *Soil;* Merril, *Rocks, Rock Weathering, and Soil.*

References on irrigation: *Year-Book of the Department of Agriculture*, 1895, p. 482; King, "Irrigation," *The Soil*, pp. 75, 268; Marsh, "Irrigation," *The Earth*, pp. 67, 448; Liebig, "Effect of Irrigation on Injurious Organic Matter," *Modern Agriculture;* Murray, "Irrigation in Egypt," *Handbook, Egypt*, p. 47; "Drainage and Irrigation," *Iconographic Dictionary*, pp. 32, 323.

APPLIED MATHEMATICS.

GEORGE W. MYERS.

THE TEACHING OF ARITHMETIC.

MANY schoolmasters seem quite certain that most of the troubles which afflict school work have their root in arithmetic. The basis of their certainty is not sufficiently clear, however, to carry conviction to the minds of those hard-headed, practical men whose contact with affairs leads them to look upon school work as a serious matter for those pupils who have their place in life to make and to hold. To such persons education means much more than the devising of a system for exemplifying, or even *verifying*, pedagogical tenets. Fortunately for all of us, there is always one or more of such "troublesome fellows" in an important official relation to the school system of nearly every community.

If it were not for this fact, it can scarcely be doubted that the mathematical subjects would have fallen out of the curricula long ago. These subjects are rarely upon the program of instruction because the superintendent or the teacher would have them there. It is so much more agreeable, generally, to have to do with subjects which deal with opinions, or with more or less plausible vagaries and generalities, where there are no easy

means of testing thought-processes, and where it matters little whether the view advocated is correct, that, if most teachers — especially elementary teachers — could have their way, they would relegate these more exacting subjects to the limbo of the educationally useless.

Many of the theories which the self-styled reformers in education have advocated to render palatable the mathematical pill have coated the distasteful morsel so thickly with what they regard as wholesome that there is really none of the remedial virtue left. Correlation, as commonly conceived, which simply eliminates every demand for pointed and clear-cut thinking and speaking, concreting number in such wise as to concrete out every mental act allied to numbering, belongs to this category of theoretical dodges of number-teaching. These and all similar *devices*, not for teaching, but for dodging number, last their little day — serve, in fact, the function they were devised to serve, viz., lift their inventors to prominence and profitable places — then pass away of their own inherent dearth of vitality.

Then, following closely upon the failure of the number panacea, comes a stentorian voice from without, demanding that the youth be instructed in the rudiments of those subjects without which success in life is impossible. The laiety now have their day, until some ingenious pedagogue shall revamp an old device and invent a new name for it; then the love of schoolmen for catch-phrases will again for a time triumph; and so on *ad infinitum*.

In the midst of all this it is well to keep in mind that artifices and artificial subject-matter are continually accumulating, and that real difficulties are being relegated to the background, while artificial difficulties mount into prominence.

About the only inference which may now be safely drawn from the mathematical situation is that teachers do not determine whether they will teach arithmetic. They may exercise some measure of choice as to manner and matter, but very little as to whether or not it shall be upon the program of instruction.

The reason for this limitation upon the teacher's power to

dispose over this subject lies in the fact that there is a necessity in the nature of things that the mind shall view them under a number aspect. This necessity has its roots in two facts. The first is that there is a multiplicity of existing things and relations of things; and the second, that the human mind, while desirous of knowing, is greatly limited in its power to comprehend truths not clearly perceived and related. So long as this desire clings to the mind of man, and he must seek means of economizing his capabilities, so long will it be necessary for the unwilling teacher to disturb his mental peace with the question of better mathematical teaching.

OUTLINE OF WORK FOR JANUARY.

I. Number-teaching in the kindergarten.

II. Reasons for teaching number in the primary grades. (1) Educational reasons; (2) practical reasons.

III. Extent of the number-teaching in the primary grades. (1) First year: development of numbers to 12. (2) Second year: number "building" through "parting and wholing" of numbers to 30 or upward. (3) Third year: factors of numbers to 144 for use in teaching tables, and some effort to render operations automatic. (4) Fourth year: mastery of four fundamental operations; some number generalizations.

IV. Subject-matter by which this is to be accomplished. (1) The pupil's needs and interests as determining factors. (2) The environment as a determining factor. (3) The other subjects as determining factors. (4) Insight and alertness of the teacher as a factor.

V. Preliminary work. (1) The number concept is a growth; it cannot be manufactured. (2) Comparison — indefinite and definite. (3) Measurement — direct and indirect — of (*a*) lines; (*b*) surfaces; (*c*) solids; (*d*) weights; etc. (4) Counting. (5) Construction.

VI. Original problems. (1) Outdoor work: (*a*) in measurement; (*b*) in geometrical construction on the ground. (2) Paper-folding and paper-cutting.

VII. Number work in nature study, in geography, in art, etc. (1) To be number work, the number concept must be the most prominent thing in consciousness. (2) *Routine drill* without the conscious exercise of the numbering faculty is harmful. (3) Too much repetition of a few simple and familiar operations is the danger of incidental number-teaching.

VIII. Preparation of the teacher for the number lesson.

IX. Preparation of number plans for the grades.

HOME ECONOMICS.

ALICE P. NORTON.

OUTLINE OF WORK FOR READING AND DISCUSSION.

(CONTINUED FROM NOVEMBER.)

V. Composition of foods. (1) Upon what foods are we to depend for our chief supply of the different food principles? (2) Percentage composition of some common foods: milk, eggs, meat, bread, etc.

VI. Further study of food principles. (1) Albumen, as a typical proteid: (*a*) composition; (*b*) tests; (*c*) cooking temperature, and effect of different degrees of heat. (2) Carbohydrates: (*a*) composition; (*b*) classification (see COURSE OF STUDY, Vol. I, No. 4); (*c*) cooking temperature. (3) Fat: (*a*) source and composition; (*b*) comparison of animal and vegetable fats; (*c*) effect of cooking upon digestibility.

VII. Digestion of foods. (1) Organs of digestion and their adaptation to their functions. (2) Processes of digestion and changes in food.

VIII. Outline for study of special foods: fruits, cereals, bread, milk, eggs, meat. (Some of these outlines, as worked out in the class, are given below.)

EXPERIMENTS.

VI. Fill a test tube to about one-third of its capacity with white of egg, and immerse in a beaker of water. Suspend a thermometer in the test tube, and heat the water slowly to boiling. Note all the changes in the albumen and the temperature at which they occur. Examine the egg after the water has been boiling a few minutes.

VII. Cut the white of an egg with scissors, dilute it with ten times its amount of water, shaking it thoroughly, and filter it. Heat in a test tube some of the filtrate.

To show the presence of albumen in meat or fish, heat the water in which a small piece of either has been soaking for a few minutes, and note the coagulation.

VIII. To about 5 ^{cc} of dilute white of egg in a test tube add a few drops of nitric acid, and heat. Cool, and add a few drops of ammonia.

Test meat, flour, and several other food materials for proteid in the same way.

IX. Examine, under the microscope, the starch obtained in experiments III and IV. Stain a portion of each with iodine.

X. Mix one-half a teaspoonful of cornstarch with half a tumbler of water and let it stand. Mix the same amount of cornstarch and water in a beaker and heat to 140° F., and let stand a few hours. Use the same amounts of cornstarch and water, and boil. Examine a portion of each under the microscope.

XI. Place in a test tube 5 ^{cc} of a weak solution of copper sulphate, and introduce a small amount of glucose. Add strong caustic potash solution till the precipitate, which at first forms, dissolves. Heat to boiling. Compare the result with that obtained by heating copper sulphate and caustic potash without the glucose.

XII. Heat carefully, in an evaporoting dish, about five grams of corn-starch, stirring constantly. After heating about ten minutes, add water, and boil. Filter the mixture, and to a small portion of the filtrate add twice its bulk of alcohol. The precipitate is dextrin. To the remainder of the filtrate add 1 ^{cc} of hydrochloric acid and boil until a drop of the liquid taken out gives no color with iodine. Neutralize with sodium carbonate and test for sugar.

XIII. Make a thin starch paste (boiled). To it add saliva, and after allowing it to stand for a few minutes, test the mixture for sugar.

The following outlines for the study of special foods were suggested by the class as covering the points which one would take up in teaching grade classes. It was recognized that the logical order here given would frequently not be the pedagogical, but that the latter would vary with the class to be taught. As a rule, the place to begin would be with the actual cookery of the food.

FRUITS.

I. Definition. (1) Technical. (2) Special use of term.

II. Relation of the fruit to the life of the plant.

III. Kinds.

IV. Geographical distribution. (1) Tropical and temperate. (2) Areas of production. States, countries.

V. Fruit industries. (1) Cultivation: (*a*) position of orchard; (*b*) soil; (*c*) climate. (2) Drying. (3) Canning and preserving. (4) Wine-making, etc.

VI. Commercial value.

VII. Storage and transportation.

VIII. Cookery. (1) Stewing: (*a*) fresh fruits; (*b*) dried fruits. (2) Canning. (3) Jelly-making. (4) Preserving and pickling.

IX. Food value and digestibility.

REFERENCES: Bergen's *Botany; Report of Department of Agriculture*, 1900; "Fruit Industry in California," *Popular Science Monthly*, Vol. XLIV, p. 200; "Fruit as Food and Medicine," *ibid.*, Vol. XLVII, p. 677; "The Dried-Fruit Industry of California," *American Kitchen Magazine*, December, 1901; Bailey, *Principles of Fruit Growing*.

CEREALS.

I. Introduction. (1) Origin of name. (2) Family.

II. Kinds.

III. Geographical distribution. (1) Original home. (2) Present areas of growth.

IV. Cultivation: soil, climate, etc.

V. Preparation for food. (1) Primitive methods. (2) Present methods: (*a*) threshing, etc.; (*b*) milling.

VI. Storage and transportation.

VII. Commercial value.

VIII. Special study of wheat. (1) Structure of plant. (2) Structure of grain. (2) Comparison with other cereals.

IX. Experiments to separate from flour: (1) starch, (2) gluten.

X. Cookery.

XI. Food value.

REFERENCES: Chase and Clow, *Stories of Industry;* Sargent, *Corn Plants;* Pratt, *Fairyland of Flowers* (for story of Ceres); Baldwin, *Old Greek Stories; The Great World's Farm;* "Breeding New Wheats," *World's Work*, May, 1901; *American Kitchen Magazine*, December, 1900; September, 1901; *Monograph on American Social Economics*, No. 3.

MANUAL TRAINING.

IRA M. CARLEY.

THE working-drawings, Figs. 1 and 2, are of a small oak table which was made (and planned, to a considerable extent) by a boy of the eighth grade. It is reproduced here, partly because it proved, when completed, to be of quite pleasing design, and partly to show how largely mathematics enters into even very simple problems in construction.

The first step in making the plan was the free-hand sketch. This was worked over and changed until it appeared satisfactory in proportions and construction. The next step was to decide on the scale for the working-drawing. It was decided to make the drawing one-fourth actual size. All the main dimensions were then reduced to this scale. In this particular case this involved, of course, only very simple operations in fractions.

The number of planes of projection necessary, or the number of "views" to be shown, was found to be two, namely, the "plan" and an elevation. After the circle representing the outline of the plan had been drawn, the next problem was to divide it into three equal parts, to locate the centers of the legs.

This might have been done, of course, by using a 30° drawing triangle on the T-square, but it was not suggested by anyone, so the value in degrees of one-third the circle was taken. Then the construction of an angle of 120° at the center of the circle was seen to be required.

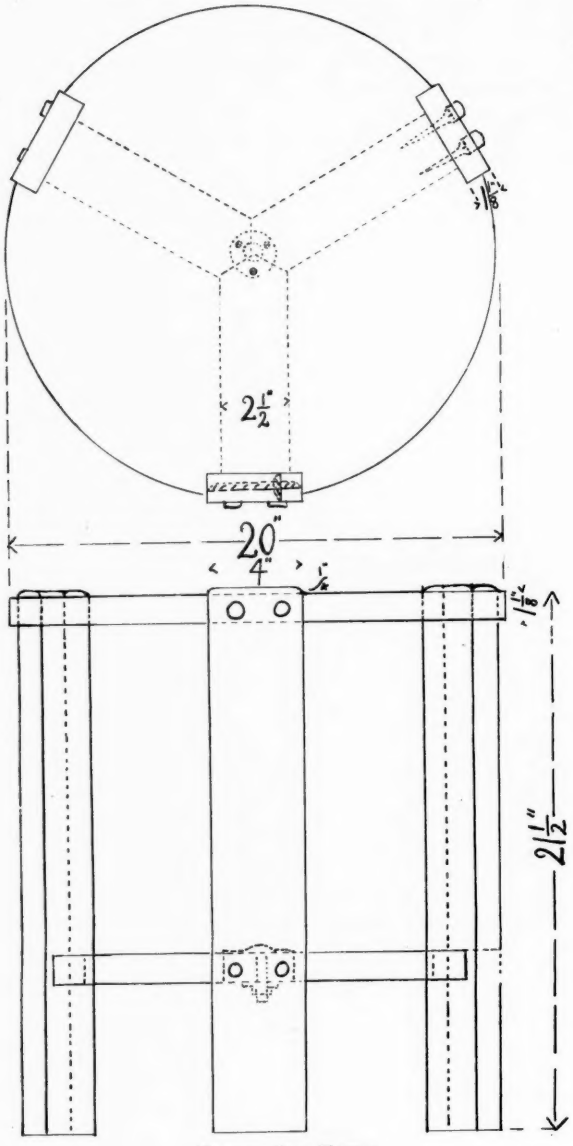


FIG. 1.—OAK TABLE.

The equilateral triangle was used as a means to this end, and finally it was found that the radius of a circle, laid off as a chord, cut off an arc of 60°. So this chord was used twice to lay off the third of the circumference.

Having laid off the center points for the legs, it was next necessary to draw the lines representing the faces of the legs, *AD*, etc., perpendicular to the radius, going through the middle point. To do this, the radius *PB* was drawn and extended, and at point *O* a perpendicular was erected; the construction being repeated at each corresponding point on the other legs. At point *P* another perpendicular was erected on which to lay off the width of the brace. In this and the corresponding cases, the construction for erecting a perpendicular at the end of a line was used, the idea of the angle inscribed in a semicircle being always a right angle being brought forward.

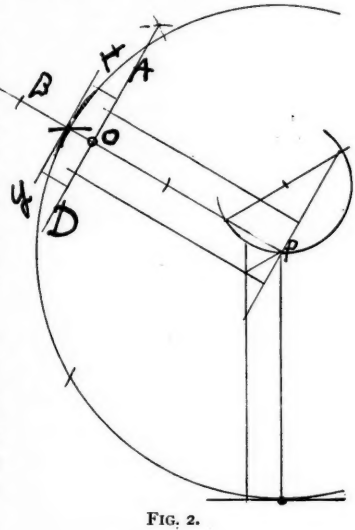


FIG. 2.

In passing, attention was called to the fact that the radius *PB*, which was perpendicular with the chord *AD*, also bisected it. This was tried several times, and noted for future proof. Also that the line *GH*, which touched the circle where the radius intersected its circumference, was also perpendicular to the radius. In laying off the angle where the braces meet at the center, the question of supplementary angles was taken up, and of the relation of an exterior angle of a triangle to the opposite interior angles. This was done in order to be able to lay off the proper angle at which the T-level should be set to mark off the ends of the braces for sawing. In the actual construction of the table, the most difficult problem encountered was the fastening securely of the three braces where they meet at the center. This was met by using two heavy iron washers, which were drilled for screws, as shown in the plan; and to give additional rigidity, a three-eighth inch carriage bolt was used to draw them firmly together. The table was stained brown and then given a faint tinge of green, with aniline alcohol stains, and then shellacked to a dull finish.

It may be noted that in a case where an individual pupil encounters a number of typical problems, as in this instance, it seems a good plan to have them worked out by the whole class.

In addition to the wood-work for Christmas, several quite satisfactory attempts were made in copper-work. Among these

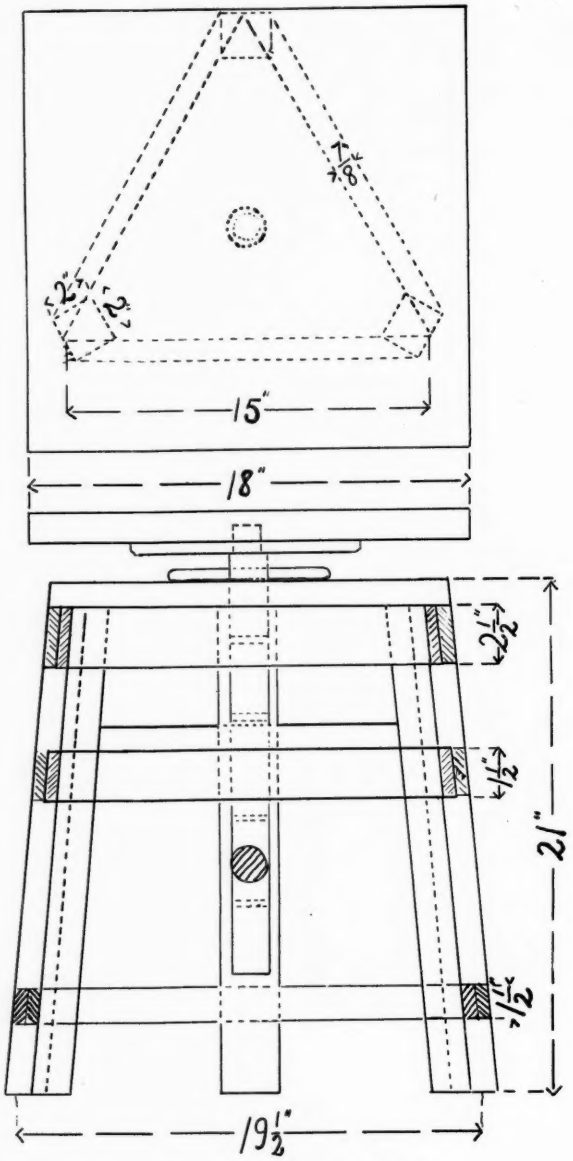


FIG. 3.—CLAY-MODELING STAND.

may be mentioned hasps, hinge- and lock-plates for cabinets and boxes, and corners for small chests. Several pen trays and ash trays, also, were beaten out of sheet copper and decorated in repoussé. A description of this work, with working directions, will be given in a future number of the COURSE OF STUDY.

The drawing numbered 3 is a plan of a modeling-stand which is being worked out by the pupils of the seventh and eighth grades. Sixteen of these stands will be made for the clay-room.

A HOME-MADE POTTERY KILN.

IRA M. CARLEY.

DURING the session of the School of Education in the Kozminski School last summer, a kiln for burning work in clay-modeling was built of brick, under the direction of Miss Antoinette B. Hollister. A kiln may be purchased for about a hundred dollars. This kiln of brick was built to demonstrate how cheaply a serviceable kiln can be constructed. The cost of the material was in the neighborhood of eight dollars. With the labor, a good bricklayer for two days and a helper for one day, the total cost approximated twenty dollars. The kiln may be built either indoors or out. Below are given plans of it and directions for building:

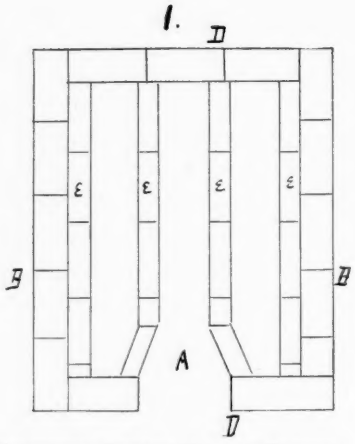
The kiln is built entirely of fire brick, laid in fire clay. The sides, floor, and top of the muffle, *M M*, are built of fire brick of half the thickness of those used for the outside.

Before beginning to build the kiln, if made out-of-doors, a hole about one foot deep, and of the dimensions of the ground space to be occupied by the kiln, should be dug and filled with loose stones and cinders. On the upper layer of cinders a floor of common brick is laid level with the ground.

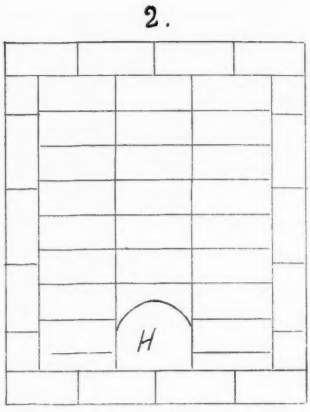
Fig. 1 shows the ground plan, or, rather, a horizontal section an inch above the ground, the rows of bricks, *e e e e*, being simply to support the floor above. The opening and fireplace are at *A*.

Fig. 2 shows the horizontal section at *F F* (see Fig. 5); that is, the floor above Fig. 1. This floor is built of large fire brick. *H* is the hole by which the heat passes under and around the muffle.

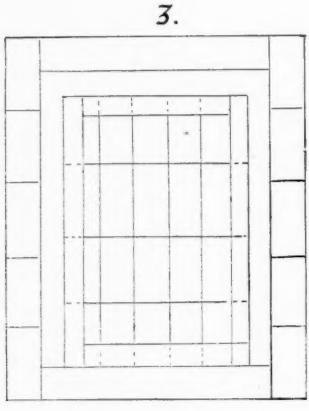
Fig. 3 shows the floor of the muffle. The cut is a horizontal section at *O O* (Fig. 5). The floor of it is made of the thin brick, supported by pieces



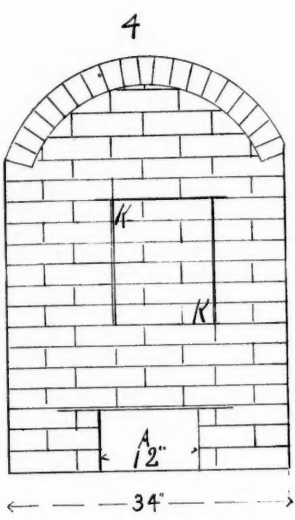
HORIZONTAL SECTION 1″ ABOVE GROUND.



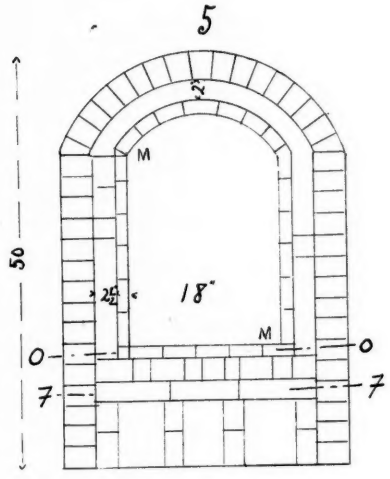
HORIZONTAL SECTION AT *F F* (FIG. 5).



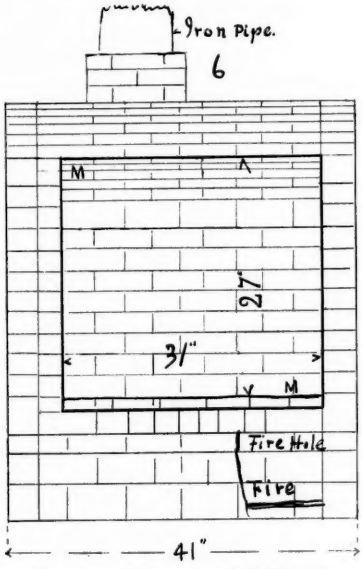
HORIZONTAL SECTION AT *O O* (FIG. 5).
Scale $\frac{1}{8}''=1''$, reduced to $\frac{1}{4}$ size.



FRONT ELEVATION.



VERTICAL SECTION AT *B B* (FIG. 1).



VERTICAL SECTION AT *D D* (FIG. 1).

of brick, *so placed as to leave as much air space as possible under the muffle and yet support the floor.*

Fig. 4 shows the front elevation of the kiln, *K K* being the opening into the muffle. The bricks are set loosely in this opening, so that they can be removed when the kiln is to be charged. When the kiln is charged, they are replaced and plastered over with fire clay. *A* is the fire opening. The bricks above it are supported by a strip of iron about three-sixteenths of an inch thick and one and a half to two inches wide.

Fig. 5 is a vertical section at *B B* (Fig. 1), showing shape of the muffle *M M*, and the air spaces around it through which the heat draws. Owing to the thinness of the bricks composing the muffle, it is well to extend a few bricks through from the outside wall to give support to the walls of the muffle.

Fig. 6 is a vertical section at *D D* (Fig. 1), showing the longitudinal form of the muffle and the location of the chimney. The opening of the chimney should be about five inches in diameter. It should be built of brick to a height of about two feet, and extended beyond that with sheet-iron pipe to a height of at least five feet above the bricks.

After the kiln is completed, as shown in these plans, it is well to inclose it in one or even two layers of common, cheap brick, set in mortar.

The fuel used is kerosene. It is burned in a pan placed in the fireplace. The pan is fed by a pipe three or four feet in length and about one-quarter or three-sixteenths of an inch bore, having a funnel at its outer end into which a small stream of oil flows from a tank fitted with a small faucet.

The supply tank is placed above and somewhat to the side of the fire opening, the pipe being bent to fit location.

The pipe should enter the fire-pan at the edge and not from above, to avoid heating the oil in the pipe too much.

PHYSICAL TRAINING.

CARL J. KROH.

THE endeavor during the present quarter will be to promote a stronger realization of the more immediate purposes of physical training by enhancing individual proficiency. To this end, the work of the various student classes will be brought into closer relation through a study of work adaptation on the basis of definite class aims, as indicated in the COURSE OF STUDY, Vol. I, No. 2. Skill in illustrating and conducting, on this basis, prescribed lessons, and lessons outlined by the students themselves, will determine priority with reference to teaching qualifications.

The regular class periods will be devoted exclusively to the practical aspects of the training, *i. e.*, to the study of the respective practice orders and to gymnastic practice. Work adaptation will conform to the general plan of gradation and group arrangement of students. Students qualifying as group teachers will be assigned special work.

The theoretical work will be distinct from the regular practice, and problems arising with reference to subject-matter, and in discussions, will be referred to section and committee conferences for special study and report.

In this way it is hoped to obviate the restrictions imposed by the limitations of the regular schedule, and to facilitate the practical work, and also to obtain a more thorough consideration of the problems suggested in the COURSE OF STUDY.

OUTLINE FOR JANUARY.

Planning of class-room and gymnasium practice orders, representing general and specific lesson content, adapted to the different grades. Considerations with reference to progress. Critical study of points in effective training, with especial reference to class aims suggested in the outlines, Vol. I, No. 2. Specific aims, correction of postural defects. Means: selection, construction, sequence, and co-ordination of subject-matter. Values: adaptation, form, and technique of execution. Methods: illustration, direction; terminology, commands. Results: effects of training and instruction upon growth, the will, and intelligence. Comparisons of the work and play of groups and classes.

WINTER GAMES AND SPORTS.

HOCKEY.

The spirit of the game of hockey is pretty much the same as that of football, the object being to strike a ball through a goal marked by two uprights 4 feet high and 6 feet apart. The principal difference is that the instrument of propulsion is a light, hooked stick, or "hockey" (of some tough wood, as ash, and about the length of a cane), instead of the foot, and that the ball is of solid India rubber and about 2½ inches in diameter. A twine ball, or a cloth ball, is preferred by some players. A field about 75 to 100 yards long, and about 30 to 40 yards wide, marked by goals near the end, as in football, and by flags at the sides, will accommodate about twelve players on each side without dangerous crowding during play.

Good players drive the ball along by a succession of taps, and guide it in and out between the opposing groups of hockeys by a mere play of the wrists, scarcely ever lifting or swinging the hockey above the shoulders.

The play is governed by the following rules: (1) The choice of goals shall be decided by tossing, and the side winning the toss shall start the ball from a spot 10 yards in front of its own goal. (2) The ball shall be played with the hockey; it shall, however, be lawful to stop the ball with the body or the legs, but not with the hands. (3) A goal is gained when the ball is played through between the posts and under the cord by the opposing party, or in any way passed through by the side owning the goal. (4) No player shall strike the ball back-handed; in every case the player must play facing the opponent's goal. (5) A player is not permitted to loiter near the adversary's goal, but may be required to retire, when not playing the ball, to a distance of at least 25 yards. (6) The side scoring the greatest number of goals in a given time wins the game.

The respective sides must be captained. A referee shall adjust all disputes over points not covered by the rules, appoint the goal umpires, or keepers, one from each side, control the timekeepers, and keep the score.

ICE HOCKEY.

The game of ice hockey is played by designating a "home" some 50 feet square, in which one party of players strives to keep the puck, while the other party of players strives to drive it as far away as possible from the home to a distance agreed upon, or to another home. Or the skating surface may be divided by a center line, with additional lines 10 or 15 yards from each side of the center line. The toss of a coin decides on which side the ball is to be dropped by the respective leaders. In beginning, the players of both parties form a circle around the ball, players of both sides alternating. When all is ready, the command to start is given by the leader of the party having the ball on its side. Goals may be fixed at a distance from 30 to 60 yards from the center line.

CURLING.

A curling surface consists of a smooth stretch of ice about 100 to 125 by 25 feet. Near the ends of this stretch a mark, called a "tee," is placed. Around the tee as a center is drawn a circle about 14 feet in diameter, leaving a margin of about 6 feet between it and the end line of the field. Two smaller circles, respectively 8 and 4 feet in diameter, are marked within this circle. The space thus marked is called the "hoose." About a dozen feet or so behind the tee and to the left of the center line of the stretch another smaller circle, about 2 feet in diameter, is drawn for the standing start of the players. To count a "put" or "swing," one foot must be kept within this circle.

The playing is done with large-sized stones — flattened spheres — weighing from fifteen to thirty and more pounds, which are provided with handles, and are highly polished so as to be very smooth (see models, sporting goods departments, down town). The players, each provided with two stones, take their places at the sides of the respective tees and start the stones in proper

order down toward the other tee. A stone put on or within the outer circle counts one; on or within the next circle, two; to strike a tee counts one; to displace it beyond the outer circle, two; a stone failing to pass into the hoose does not count. In competitive games various ways of scoring are devised according to the skill of the players (see rules, National Curling Club, New York).

Teams usually consist of four pairs. Each player puts a stone alternately with his opponent until both stones are played. The proper rotation of players is maintained by the leader of the game, who is known as the "skip." Games are played for a specified time or a certain number of shots.

An amusing feature of the game is the "sweeping." The players, after delivering their stones, quickly grasp their "sweeps," or brooms, and brush away the particles of ice from the path of a moving stone, in order that it may glide a longer distance. If a stone shows a sign of weakness, and there is doubt as to whether it can reach the hoose, the players begin to sweep for dear life to "coax" the stone toward the tee. To this end the skip directs them to keep beyond the center of the stretch. The moment it passes the tee the other side may sweep it out of the hoose if it can. The sweepers become very expert and not infrequently bring a stone to a standstill at just the right place.

OUTHOPPING GAMES — FÓOT-IN-THE-RING.

After an energetic lesson in gymnastics, the participants are arranged around a plainly marked chalk ring, two feet in diameter, standing, sitting, or lying down. One of them, selected to begin the game, stands in a stride or lunging position, with the forward foot placed in the ring, arms crossed abreast; another player attempts to dislodge him by adroit attacks, feinting and pushing, hopping on one foot, arms abreast. The center player evades all attacks by constantly moving out of reach, dodging, bending, jumping, suddenly facing about, etc., without meeting any attacks with counter-attacks. Both players may use all fair artifices to defeat each other; however, kicking or tripping bars a player from the game. The player in the ring loses when displaced; the other upon touching the floor with both feet simultaneously. Good players may defy two parties attacking from opposite sides.

When the game is played outdoors, from five to eight players may stand within a circle formed by from twenty-five to thirty boys. These players, hopping on one foot, attempt to oust one of their number, previously designated, from the circle. The player thus attacked seeks to evade all individual or concerted action by running and dodging. When he is forced out of the circle, a new set of players enter, and so on until the whole class, in turn, has been in the ring. The "hoppers" must keep their arms abreast and at no time use their hands, simply pushing with their shoulders.

APPARATUS GYMNASTICS.

(For reference throughout the year.)

POLES, ROPES.

Apparatus.—Eight hanging poles, 16 to 20 inches apart. (Height: 10 to 18 feet; diameter: 1 ⅜ inches; material: yellow pine wood.)

Class formation.—As many files of six or eight pupils in "flank order" as pieces of apparatus; arm length's distance between pupils.

Marching order.—Pupils leave head of files to approach apparatus, the class stepping forward one or two steps with each succession upon the command "March," and align rear of files close of exercise.

PRELIMINARY EXERCISES.

Executed in class order. Arm movements "upward" are executed in the direction "forward."

Raise arms backward (shoulders back)—begin! 1, 2!

Swing arms upward—begin! 1, 2!

Raise arms backward, swing upward and lower—begin! 1, 2, 3!

Raise heels—begin! 1, 2! (Hands on hips.)

Bend knees—begin! 1, 2!

Raise heels, bend knees (trunk erect), and straighten to "fundamental" position—begin! 1, 2, 3!

Raise arms backward and bent-knee position—stand! Swing arms upward and on tip-toes (quick knee-straightening movement)—stand! Arms and heels—down! Begin! 1, 2, 3!

(The series is executed without halting between exercises.)

(Add to second movement of last exercise: Upward springing movement [body—legs—fully extended]; alight to bent-knee position, etc., 1–4.)

I.

Spring upward to hang-support position (arms extended), right hand uppermost—1, 2! Down![1]

The first eight pupils advance upon the command "March!" At "one" bent-knee position on tip-toe with arms raised backward is taken; at "two" the pupils swing arms upward and spring to hang position to grasp the poles as high as they can reach. The body hangs fully extended, legs and feet firmly closed, head erect. Upon the command "Down!" the pupils alight to bent-knee position (poles still grasped) and resume fundamental standing position. Or, command "one" for position on tip-toe, "two" for bent-knee position with arms raised backward, and "three" for hang position, "four" for the landing, and "five" for the standing position. Upon the command "March!" the pupils face about and return to their places, passing left

[1] Beginners may advance to the poles—grasping as high as they can reach from the standing position on tip-toe—and place one foot or leg against the poles from the rear by raising the knee, and spring from the other foot, carrying the same in front of the pole to "hang-support position with foot-grasp"

flanks of files, the next rank in order advancing, the class taking one or two steps forward — as needed, to recover position.

Same, with foot-grasp, left leg (foot) front, right leg (foot) rear of pole, left hand uppermost — 1, 2! Foot-grasp — change! Down!

(The foot-grasp should be close, with feet [ankles] firmly clasped around the poles and extended downward.)

Hanging position, foot-grasp, arms bent — 1, 2! Arms — stretch! Down!

Hanging position, foot-grasp, arms extended — 1, 2! Knees — raise! (Knees are raised as high as possible without bending the arms.) Stretch! Down!

Hanging position, foot-grasp — 1, 2! Arms — bend! Stretch! Down!

Hanging position, foot-grasp — 1, 2! Arms — bend! Knees — raise! Knees — stretch! Arms — stretch! Down!

II.

Foot-grasp.

Spring to hanging position — 1, 2! Arms — bend! Change foot-grasp, knees — raise! Change foot-grasp, knees — stretch! Arms — stretch! Down!

Hanging position — 1, 2! Arms — bend! Change hand-grasp (other hand uppermost) and knees — raise! Arms and knees (hand-grasp as at first) — stretch! Down!

Hanging position, arms bent — 1, 2! Knees — raise! Change hand-grasp upward repeatedly, uppermost hand leading, until body is extended — begin! (Support body by holding the feet in position — foot-grasp firm, without slipping.) Down!

Hanging position, arms bent — 1, 2! Knees — raise! Extend body upward by changing hand-grasp, hand-over-hand — begin! Lower body (foot-grasp firm) by changing hand-grasp downward — begin! Legs — stretch! Down!

Hanging position, arms bent and knees raised — 1, 2! Extend body upward by grasping upward simultaneously with both hands — begin! Down!

Repeat last exercise, changing grasp of hands (left and right hands uppermost alternately) during upward movement — begin! Down!

III.

Hang-support position with foot-grasp — 1, 2.

Arms — bend! Knees — raise! Knees — stretch! Arms — Stretch! Repeat! Down!

Bend arms and raise knees (and stretch) simultaneously — begin! Halt! Down!

Bend arms and knees — raise! Grasp upward with both hands simultaneously until the body is fully extended — 1, 2! Bend arms and knees — raise! Repeat upward extension, arm-bending and knee-raising, until the top of the pole is reached. Down! [Grasp as low as possible with both

hands (below the chest), bending body sharply (hips and knees—foot-grasp firm)—1; lower the body (fullest extension)—2; repeat downward grasp (with foot-grasp firm) and body extension downward, till the floor is reached.]

Repeat exercise, changing foot-grasp.

Repeat exercise, circling around the pole (without change of foot-grasp). Down!

Repeat exercise, grasping upward with left hand leading.

Repeat exercise, right hand leading in each upward grasp.

Repeat exercise, with hands leading alternately.

(Downward movements correspond to upward movements.)

IV.

Hanging position (without foot-grasp), legs in full-stride position outward—1, 2! Bend arms—begin! Halt! Down!

Hanging position, foot-grasp—1, 2! Climb upward, hand-over-hand, right hand leading—begin! In full-stride position outward, hand-over-hand—down!

Hanging position, foot-grasp—1, 2! Climb upward, hand-over-hand—begin! In full-stride position outward, grasping downward with both hands simultaneously—down!

Hanging position, legs in full-stride position outward—1, 2! Climb upward, hand-over-hand—begin! Glide downward with foot-grasp (slowly), grasping downward with both hands simultaneously—begin!

Hanging position, legs together—1, 2! Climb upward, hand-over-hand—begin! Glide downward with foot-grasp, left and right hands grasping downward alternately (below chest)—begin!

Same, but glide downward with left hand on hip, grasping with right hand.

Same, but glide downward with both hands on hips (or arms extended outward, etc.)—begin! (Body is held erect, close to the poles.)

TABLES OF GROWTH.

FRANCES MUSSELMAN, CAROLINE CRAWFORD.

The following studies and records of size and growth for age and sex are given as a suggestive outline for the teacher to use in studying the development of the child.

The tables compiled in America are placed together to bring out the variations found by the different investigators in the various parts of the country.

The most important study from these tables for the teacher is the observation of the normal annual increase in growth. While a child may be below or above an average size, yet the normal annual increase in development remains, in relation to

that size, fairly constant. A falling below the normal growth-rate is often the first indication of a weakened physical condition, which may mean a failure to keep up with the grade, or, may be, even the graver sign, susceptibility to disease. An overgrowth annually may be the first indication of the sluggishness produced by the great amount of energy used in building the body. This must necessarily be at the expense of its action, unless the power of functional development is also far beyond the normal.

As the normal growth must be taken into account in preparing the school course, so the abnormal development, or the lack of development, should also be a guide as to the variation necessary in that prescribed course of study.

The tables of Porter are made from measurements of St. Louis school children; those of Bowditch, of Boston children (first column includes all nationalities, second column American); those of Christopher are made from Chicago children of American parentage; and the tables of Sargent include children from various parts of the country.

The height, standing, is taken without shoes. The weight, except in the Sargent measurements, includes the clothing.

The records are in centimeters and kilograms. To change centimeters to inches, divide by two and one-half. To change kilograms to pounds, multiply by two and one-fifth.

HEIGHT, STANDING.

(Centimeters.)

Boys.							Girls.						
Age.	Porter.	Rotch.	Bowditch.	Bowditch.	Christopher.	Sargent.	Age.	Porter.	Rotch.	Bowditch.	Bowditch.	Christopher.	Sargent.
Birth	.....	49.3	.....	.....	.....	.....	Birth	.....	48.1	.....	.....	.....	....
1 yr	.....	73.8	...	.....	.....	.....	1 yr	.....	74.1	.....	.....	.....	.....
2 yrs	.....	84.5	.....		.....	.....	2 yrs	.....	82.3	.....	.	.....	.....
3 ...	.....	92.6	.....	....	....	.....	3 ...	.....	90.7	.....	. ..	...	.....
4 ...	.....	98.2	.	.....	100.8	.....	4 ...	.....	97	.... .	.....	101.1	.....
5 ...	.....	103.9	105.8	106.2	107.1	.....	5 ...	.....	103.2	105.2	105.7	106.7	.....
6 ...	109.2	109.3	111.4	111.7	114.2	.....	6 ...	108.1	108.3	110.2	110.7	112.7	.....
7 ...	114.4	114.3	116.4	117.7	118.3	.....	7 ...	113.4	113.8	115.9	117	117.8	.....
8 ...	119.7	119.4	121.5	122.7	124.5	.....	8 ...	118.7	118.9	121	122.4	124.2	.....
9 ...	124.8	124.2	126.4	127.1	128.2	.....	9 ...	124.1	123.4	125.8	126.2	128.8	.....
10 ...	129.4	129.2	131.4	132.6	132.9	136	10 ...	128.8	128.3	130.7	131.8	132.5	133.8
11 ...	134.4	133.3	135.6	137.5	138.2	140	11 ...	133.6	133.5	135.7	137	138.9	140.6
12 ...	138.5	137.7	140	141.4	143.7	145.2	12 ...	139.5	139.7	141.9	143	144	147.5
13 ...	143.2	143	144.7	147.6	149.6	150	13 ...	146.1	145.4	148.3	150.1	152.5	153.2
14 ...	148.8	149.7	151.4	154.3	157.4	157.5	14 ...	151.9	149.8	152.9	153.6	156.2	.....
15 ...	155.2	.....	158.4	160.4	160.9	165	15 ...	155.8	.....	155.5	156	156.4	157.5
16 ...	161.2	.....	166	167.7	167.5	171.6	16 ...	158	.....	156.9	157.5	156	159
17 ...	166	.....	168.2	168.6	.....	171.9	17 ...	159.4	.....	157.9	158.3	.....	160
18 ...	170.5	.....	169.6	169.6	.....	172.4	18 ...	159.5	.....	.....	.....	.....	160.6

WEIGHT.

(In kilograms.)

Boys.							Girls.						
Age.	Porter.	Rotch.	Bowditch.	Bowditch.	Christopher.	Sargent.	Age.	Porter.	Rotch.	Bowditch.	Bowditch.	Christopher.	Sargent.
Birth	....	3.25	....	....	....	....	Birth	....	3.15	....	....	....	....
1 yr	....	9.5	....	....	....	....	1 yr	....	9	....	....	....	....
2 yrs	....	13.8	....	....	....	....	2 yrs	....	13.3	....	....	....	....
3	....	15.9	....	....	....	....	3	....	15	....	....	....	....
4	....	17.2	....	....	16.6	....	4	....	16.5	....	....	15.3	....
5	....	18.6	18.5	18.5	17.9	....	5	....	17.9	17.9	17.9	18.2	....
6	....	19.8	20.4	20.4	20.4	20.6	6	....	18.9	19.6	19.5	19.7	19.6	....
7	....	21.6	22.2	22.1	22.4	22.3	7	....	20.8	21.5	21.4	21.6	21.2	....
8	....	23.8	24.4	24.3	24.5	24.9	8	....	22.8	23.4	23.3	23.8	24.5	....
9	....	26.2	26.8	26.7	26.9	26.9	9	....	25	25.9	25.6	25.7	27.2	....
10	....	28.3	29.6	29.5	30.1	29.6	29.3	10	....	27.4	28.2	27.8	28.4	29.1	28.2
11	....	31	31.8	31.6	32.4	32	30.7	11	....	29.8	31.2	30.6	31.1	31.8	31.7
12	....	33.4	34.8	34.3	35.4	36	34	12	....	33.2	35.5	34.9	36.2	35.5	35.5
13	....	36.2	38.4	37.6	38.8	41.3	38.5	13	....	38	40.2	39.9	41.2	41.2	40.6
14	....	39.9	42.9	42.2	44.2	46.8	44.6	14	....	42.6	44.6	44.3	45.3	46.3	....
15	....	45.4	....	48	50.2	49.6	50.7	15	....	46.8	....	47.6	48.6	47.3	46.5
16	....	51.8	....	55	55.9	50.8	60	16	....	49.9	....	50.4	51.1	48.9	49.2
17	....	55.3	....	57.4	57.8	....	61	17	....	52.5	....	52.1	51.5	....	50.8
18	....	....	...	59.7	59.5	....	61.2	18	....	53.1	....	51.1	51.4	....	52

ANNUAL INCREASE IN HEIGHT.

(In centimeters.)

Boys.							Girls.						
Age.	Porter.	Rotch.	Bowditch.	Bowditch.	Christopher.	Sargent.	Age.	Porter.	Rotch.	Bowditch.	Bowditch.	Christopher.	Sargent.
Birth	...	....	...	...	...	...	Birth	...	....	...	...	...	...
1 yr	...	24.5	...	...	...	...	1 yr	...	26	...	...	...	...
2 yrs	...	10.7	...	...	...	...	2 yrs	...	8.1	...	...	...	...
3	...	8.1	...	...	...	...	3	...	8.4	...	...	...	...
4	...	5.6	...	...	...	...	4	...	6.2	...	...	...	...
5	...	4.7	...	...	6.3	...	5	...	6.2	...	...	5.6	...
6	...	5.4	5.6	5.5	7.1	...	6	...	5.1	5	5	6	...
7	5.2	5	5	6	4.1	...	7	5.3	5.4	5.7	6.3	5.1	...
8	5.3	5.1	5.1	5	6.2	...	8	5.3	5.1	5.1	5.4	6.4	...
9	5.1	4.8	4.9	4.4	3.7	...	9	5.3	4.4	4.8	3.8	4.6	...
10	4.6	5	5	5.5	4.7	...	10	4.7	4.9	4.9	5.6	3.7	...
11	5	4.1	4.2	4.9	5.3	4	11	4.7	5.2	5	5.2	6.4	4
12	4.1	4.4	4.4	3.9	5.5	5.2	12	5.9	6.1	6.2	6.8	5.1	5.2
13	4.7	5.3	4.7	6.2	5.9	4.8	13	6.6	5.7	6.4	6.3	8.5	4.8
14	5.6	6.7	6.7	6.7	7.8	7.5	14	5.7	4.4	4.6	3.5	3.7	7.5
15	6.4	....	7	6.1	3.5	7.5	15	3.8	....	2.6	2.4	.2	7.5
16	6	....	7.6	7.3	6.6	6.6	16	2.2	....	1.4	1.5	.4	6.6
17	...	....	...	...	...	...	17	...	1.3	...	...	...	.3
18	...	....	...	...	...	...	18	....	.1	....	...	...	...

ANNUAL INCREASE IN WEIGHT.

(In kilograms.)

Boys.							Girls.						
Age.	Porter.	Rotch.	Bowditch.	Bowditch.	Christopher.	Sargent.	Age.	Porter.	Rotch.	Bowditch.	Bowditch.	Christopher.	Sargent.
Birth....	...	...	...	...	...	...	Birth....	...	...	...	...	...	...
1 yr....	...	6.2	...	...	...	...	1 yr....	...	5.8	...	...	...	...
2 yrs...	...	4.2	...	...	...	...	2 yrs...	...	4.3	...	...	...	...
3	...	2.1	...	...	...	...	3	...	1.7	...	...	...	...
4	...	1.3	...	...	...	...	4	...	1.4	...	...	...	...
5	...	1.3	...	...	1.3	...	5	...	1.4	...	...	2.9	...
6	...	1.8	1.9	1.9	2.7	...	6	...	1.6	1.6	1.8	1.4	...
7	1.8	1.7	1.7	2	1.7	...	7	1.8	1.8	1.9	1.9	1.6	...
8	2.2	2.2	2.2	2.1	2.6	...	8	2	1.9	1.9	2.2	3.3	...
9	2.3	2.4	2.4	2.4	2	...	9	2.1	2.4	2.3	1.9	2.7	...
10	2.1	2.7	3.8	3.2	2.7	...	10	2.4	2.3	2.2	2.4	1.9	...
11	2.7	2.2	2.1	2.3	2.4	1.4	11	2.3	2.9	2.8	2.5	2.7	3.5
12	2.3	3	2.7	3	4	3.3	12	3.4	4.3	3.3	5.1	3.7	3.8
13	2.8	3.6	3.3	3.4	5.3	4.5	13	4.7	4.6	5	5	5.7	5.1
14	3.7	4.4	4.6	5.4	5.5	6.1	14	4.6	4.4	4.4	4.1	5.1	2.8
15	5.5	...	5.8	6	2.8	6.1	15	4.2	...	3.3	3.3	1	3.1
16	6.3	...	7	5.7	1.2	9.3	16	3.1	...	2.8	2.5	1.6	2.7
17	3.4	...	2.4	1.9	...	1	17	2.5	...	.7	.4	...	1.6
18	...	...	2.3	1.7	...	.2	18	.5	...	...	.1	...	1.2

KINDERGARTEN THEORY.

BERTHA PAYNE.

REVIEW FOR NOVEMBER AND DECEMBER.

THE work for November and December has been centered about the work in the kindergarten, and has dealt chiefly with stories, songs, and handwork.

From nursery rhymes and *Mother Goose* we went to the old fairy tales, as models of charm both in imagery and plot. The kindergarten plan caused us to look for good stories of home life and household industries. Those that were selected for our own use are given below. Thanksgiving and Christmas time brought the need of stories to emphasize some phase of these festivals. Stories related outwardly to Thanksgiving were found to be especially poor in number and quality. This search for stories related to the season, approaching festivals, or the work of the group aroused the following questions:

1. Is the primary function of these stories to bring knowledge of certain facts, or to enhance such knowledge already gained; to instruct, or to deepen the sense of values?

2. In general, should a story so related come first or last in the consideration of a subject?

3. Proposition: In its *teaching* capacity it should place facts in such relation that either one or both of the following conditions should be brought about in the children: (*a*) curiosity, or desire to know more of the topic; (*b*) an impulse to execution, or desire to carry into expression the suggestions of the story, either in dramatic form, by pictorial illustration, by making, or in some line of invention to which the story has furnished stimulus, but not necessarily a *model*.

The oft-quoted *Robinson Crusoe* furnishes a good illustration of a story that is effective in the way last mentioned.

We have illustrated stories by blackboard drawing. This has furnished a motive for especial studies of figures, chiefly men, and animals in action. The stories were told to the class by different members. Stories too old in language or too complex for the kindergarten and the first-grade groups were adapted for them. One theme was written in story form. Although the results were not artistic, this was, perhaps, the most direct help to discovering what elements are necessary to a good story.

We found no good story in relation to Thanksgiving day adapted to little children. For the older children the story of the origin of Thanksgiving presents dramatic features that lend themselves to the true story form, and, at the same time, give meaning to the day. The kindergarten children are too young to take in the facts that make the story significant. The conditions apprehended under the terms "forest," "country," "no crops," "no stores," "famine," the great distance between the new home and the old one across the water, are too great and unfamiliar to be grasped. Therefore the festival must get its meaning, so far as the little children are concerned, from its present celebration and the events connected with it. What is true of this festival is true of most of the others, *i. e.*, what is near must lead to what is remote, and the story that adds meaning must follow the same course. In our effort to find suitable stories for this purpose, and also such as relate to household work, we found few that were not open to criticism, either on the ground of sentimentality, or absence of any series of events leading to a dramatic point or climax. In order to realize fully the force of these features, a story which had been offered was criticised, the theme altered and rewritten.

Theme of story: (1) Animals are given an extra treat by little girls. (2) They wonder why. (3) The horse says it is Thanksgiving day and Patty is glad and thankful, and therefore wishes them to be; hence the treat.

Criticism: Talk of animals unnatural and sentimental. No climax. Too obvious moral.

Theme remodeled: Animals imprisoned in barn by blizzard and deep snow; without food and water for hours; children help to dig way to barn, and help to give animals their food; characteristic cries of animals described.

Reasons for changes: Children must feel need of animals. Expectation must grow, hence the conditions which make that feeling strong. In place

of *talking* about thankfulness, the hearers of the story feel glad that the animals are at last relieved from hunger and thirst. Instead of giving from sentiment, the actors of the story give because of real need.

This is given as one method of study, not as a mode of story-writing to order.

REFERENCES: *Stories of Household Work;* "Charlotte and the Ten Dwarfs;" "Snow White and the Dwarfs;" "Cinderella;" "How Hans Got a New Shirt," *Kindergarten Magazine*, Vol. I.

In addition to the work in stories and drawing, the class has begun the simpler handwork suitable for young children — folding furniture, cutting snow-crystal forms. Embroidery and mat-weaving designs will be given in the next issue.

In January the class will prepare for kindergarten practice work, and will teach in the kindergarten. Therefore the current work for the month in the kindergarten will form the center around which the theory will gather. The handwork will receive more attention, as the games and stories have done in the preceding months.

For a partial outline, please see the topics given in the kindergarten section of "History in Primary Grades," December number, p. 265; also the outline prepared by Miss Allen for the kindergarten for January.

THE KINDERGARTEN.

(FRANCIS W. PARKER SCHOOL.)

MATE H. TOPPING.

REVIEW FOR OCTOBER AND NOVEMBER.

THE subject for October and November was the life in the home from the awakening in the morning through the breakfast time. The details considered were: clothes worn; the necessary toilet preparations; the breakfast. Also some thoughts concerning Thanksgiving were presented.

The aim in the general program has been to objectify the child's everyday life in the home, beginning with what affects all the family in common, and differentiating later the duties of individual members of the household. This plan will be continued throughout the second quarter of the year.

In presenting the Thanksgiving thought, the aim was to awaken some ideas through which the children of the kindergarten might understand the preparations that were being made

in the school for the festival, and likewise the significance of the small part which they were to take in the exercises.

Another aim, which it may be possible to realize more fully in a small kindergarten than in a large one, is the elimination of the formal movement from one exercise to another. We are a family of only medium size, and try to live as such. Of course, we follow a general program, but aim at informality in its execution.

The large blocks, consisting of parallelopipeds $3 \times 6 \times 12$ inches, square prisms $6 \times 6 \times 3$ inches, long square prisms $3 \times 3 \times 12$ inches, cubes $6 \times 6 \times 6$ inches, and triangular prisms made from cubes of the dimensions of these cubes, have been a source of unending delight in building tables, chairs, beds, houses, or sleds, all large enough to eat, sit, lie, or live in. The material is so suggestive that the children need very little help in finding ways to use it.

In clay, we have made toy dishes, articles of food, or whatever else the children needed.

We tried to reproduce our images of leaves and flowers, using only subjects with primary colors. The pictures were not definite in result, but they were usually the expression of a real purpose.

The children are free to go to the blackboard during any interval, and they use this privilege from the time they come in the morning until they go home.

The gifts are generally given to the children like any other plaything, particularly the second gift. We use the correct geometric terms, and let the children find out for themselves what they can of the form and number relationships made evident even in a play-use of the gifts. We have not tried to make the gifts the means of especial drill in mathematical relations, but have taught the children how to care for the material properly. This involves taking it out and putting it back in the most economical manner.

In this free play, of which we have a great deal, the children choose for themselves where they shall play; and they never do so conventional a thing as sit at a table, but always follow the ways of primitive man and sit on the floor.

About twenty minutes of every day are devoted to different rhythmic exercises, in company with one of the primary grades, either in the kindergarten room or in the gymnasium. We play games when we feel the need of them, either in our room or in the halls.

On all pleasant days, from a half to a whole hour is spent out-of-doors, either in the park or at the sand pile in the school yard. We play games in Lincoln Park or visit the animals and the greenhouse.

We are trying to make our program such that through the activities involved the children shall form and strengthen those habits which make for the building of a good character.

FIRST GRADE.

ELSIE AMY WYGANT.

REVIEW FOR NOVEMBER.

Home economics.—The children of the first grade have enjoyed nothing more keenly than the cooking period. Each day some child inquires: "Is this our day for cooking?" The only reason that every day is not "our day for cooking" is that the present conditions do not offer sufficient accommodations to permit it.

No other subject allows more opportunity for keen attention and independence of action, requires a greater use of a child's previous experiences and interests, or offers more opportunities for social intercourse. To a large extent, the results are the child's criticism of his work. The lack of concentration which allowed the cocoa to boil over, the carelessness which misread the receipt, is criticised by its inevitable result. There is no indirect imposed punishment or reward.

We cook in order to have something to add to the pleasure of the lunch hour. The motive is a real one, and the honesty of the children's effort is proportional. To do the work in the best way demands the use of reading, writing, and number, and the interest behind it gives a purpose to the necessary drill upon this formal side. To illustrate, the first time the children made cocoa the directions were written upon the blackboard and read to them, item by item. The receipt was as follows: 1 teaspoonful of cocoa, 1 teaspoonful of sugar, 1 cup of boiling water, 1 cup of hot milk, a pinch of salt.

Each child keeps a written receipt of everything that we make, but this one was too long, required too many new words, to ask the children to write it. Yet, the next time they made cocoa they would need these words; so they wrote the list of materials necessary — cocoa, sugar, water, milk. In their next lesson they made one new thing, but repeated the making of cocoa. This time the full receipt was put upon the board in the cooking-room, and the children, having previously written the names of materials, were able, with very little help, to read it. During the cooking, when help was needed, the children were referred to the written directions.

The following week the first grade entertained the second grade at luncheon. The children were divided into three groups: the dish committee, which was responsible for setting and clearing the table; the table committee, which converted the separate desks into a long table; and the serving committee, which attended to the needs and comforts of the guests. Two children each day made the cocoa.

When planning to set the table, the children found that there were twelve in the first grade and eight in the second. They were unable to make the necessary addition, so just at that time twenty minutes were devoted to teaching

the addition of two numbers, the sum not exceeding twenty. The process was shown several times, and was followed by drill to gain rapidity of work. In the first instance every child's concentration was intense, because, in order to set the table, it was necessary to find the sum of $12 + 8$. The consciousness of a little power that came from that understanding of the process made the drill which followed a pleasure.

The following day the question arose in another form. There happened to be a dozen plates in the grade-room cupboard. How many must be brought from the cooking-room? The answer to this the majority of the children found readily, being apparently quite unconscious of the change of process.

Cocoa was prepared for these twenty people. The receipt was written for four people as follows: 1 ½ tablespoons of cocoa, 2 tablespoons of sugar, 1 pint of boiling water, 1 pint of hot milk. Five times the first item the children worked out by picturing it on the blackboard. 5×1 pint they converted into terms of pints and quarts by actual measurement. The completed receipt the children read and then worked from independently. It is now ready to be written in our receipt books.

History.— In telling the story of forms of shelter, other than the modern house, as trees, caves, cliffs, and wigwams, so many questions were asked as to how primitive people lived that we devoted our time largely to answering them, verifying our conclusions, as far as possible, by spending a morning in the Field Columbian Museum. While at the museum, the children tried to find answers to the following definite questions which had arisen, and each child worked almost independently during his visit: What did the Indian use to cut down trees for the poles of the wigwam? How did he kill animals to get skins? What did he use for the string of his bow? What did he use for the point of his arrow? How did he make fire without any matches?

During the visit, the children made sketches of things they wished to remember. Afterward they modeled them in clay.

Geography.—The work with the pebbles from the lakeshore (see outline for December) was done by the pedagogic students during the practice period. It was not possible to complete the work, and the regular teacher will continue it in December. The review of it will appear in February.

Science.—The children began to make more systematic records of the weather. They observed the direction of the wind, the color of the sky, noted when it rained or snowed, and commenced the reading of the thermometer. We put the thermometer into hot and cold water, noting rise and fall of the mercury. An enlarged picture was put on the blackboard showing, by a short horizontal line, each degree from zero to one hundred. In reading this we counted from 0° to 10°; then, in counting from 10° to 20°, we again counted 1, 2, 3, 4, etc., so that at 20° the children read 10°; immediately one child said: "That is two tens." In this manner we counted the degrees from zero to one hundred, and, disregarding the euphony of sound

which calls four tens forty, eight tens eighty, etc., we kept the original term, which suggested more plainly the numerical relationships. Thus, the children read 72° as seven tens and two degrees.

The actual thermometer was shown and the explanation made that, for the sake of economy of space, the alternate marks were omitted. The pupils erased the 1, 3, 5, 7, and 9 degree marks from the diagram and read those which remained 2, 4, 6, 8, and 10 degrees. Now they were ready to begin the daily reading of the thermometer.

JANUARY OUTLINE.

History.— Continue work on playhouse.

Literature.— "Mowgli's Admission to the Wolf Pack" and "Tomai and the Elephants," from the *Jungle Book.*

Geography.— The children's problem will be: How is it possible that we have fruit at this time of the year? In the early autumn we painted the ripe fruit and vegetables; later, on the farm, we saw the trees bare and the garden empty. As a partial answer to the question, we shall visit a cold-storage warehouse; as a further answer we shall visit the South Park conservatory, and through pictures and stories try to build up an image of a tropical country.

The references for geography will consequently be the same as those for literature, because both subjects demand a knowledge of the appearance of a tropical country; and because the stories are of India, it will be that particular tropical region which we shall study.

REFERENCES: Thomas Stevens, *Around the World on a Bicycle;* Johonnot, *Natural History;* Johonnot, *Geographical Reader;* Recluse, *Earth and its Inhabitants,* Vol. III; Sir James Tennent, *Ceylon.*

Science.— The science work will continue the geography outlined above, with a study of sources of grains and meats used as food.

The trip to the cold-storage house will contribute to this; and we shall need to make, besides, a trip to a flour mill and to the Stock Yards. While at the Stock Yards we shall drive among the live pens and visit one of the large packing houses, but we shall keep entirely away from the slaughter houses. We shall visit the round house of the Rock Island Railway to see means of transportation. Should sufficient interest result from this visit, we shall make means of transportation the study for another month.

Number.— Making of a portfolio to hold children's work. The new mathematical point required in this work will be $\frac{1}{8}$ of an inch.

Music.— "Foreign Children;" Eleanor Smith, "The Sims' Travels," *Twelve Songs for Twelve Boys;* Eleanor Smith, "The Tree in Winter," *Songs for Little Children,* Book II.

Dramatic art.— Dramatization of a story from the *Jungle Book.*

Home economics.— Hemming floor cloths for the cooking-room. Preparation of two or more articles for lunch.

SECOND AND THIRD GRADES.

(FRANCIS W. PARKER SCHOOL.)

REVIEW FOR OCTOBER AND NOVEMBER.

JENNIE HALL.

As a part of this review there are printed, below, reports written by the pupils on work relating to the food-getting industries. In writing these reports, the children worked independently, receiving no suggestions from other children and almost none from the teacher, who helped merely in spelling and punctuation and, occasionally, in diction. The reports, as printed, will be used as reading lessons.

DRIED APPLES.

We took some apples and quartered them. We had a frame. Then we strung these quartered apples and tied them upon the frame and left them there. They are drying and getting smaller. We saw a box of dried apples on our excursion to South Water street. People dry apples so they may not rot.—*Richard Bentley, third grade.*

CIDER.

First we took a knife and cut the apples. Then we took a bag and put them into a cider press. Then we turned the cider press. The juice ran out. Then it was cider. Then the apples could not be used any more. After the apples were pressed it was cider. Then we drank it.—*Elmer Meier, third grade.*

CIDER.

First we cored apples in a pan. Then we put them into a bag. Then we put them into a cider press. Then we turned it around. Then the cider ran out. We made a pint and a quarter. We drank it.—*George Dovenmuehle, second grade.*

CORN MEAL.

The outside of the corn is orange-colored. The inside of it is white. That makes different colors in the meal. And there is the part of it you can't use. That is the skin.

We shelled some corn into the coffee-mill and ground it, and then we sifted it into a bowl. All the part of it that you can't use we put into another bowl.—*Dorothy Packard, second grade.*

EXCURSION TO SOUTH WATER STREET.

We went to South Water street. We went into a big store and then we went down into the basement. There were many bananas. Then we went

to the depot and we went into one of the cars. It smelled like fish. Then we went to the docks and we went into the boat. We went up stairs and saw all the rooms. Then we went down into the hull and saw all the machinery. On South Water street there were many wagons to get the things to take to the grocery store.—*Frances Bradley, second grade.*

For morning exercise the grade gave a dramatization of the process of our getting potatoes in Chicago. In one corner of the room a farmer was digging potatoes and loading them into a wagon. The hired man drove with them to the little country station. A toy police patrol wagon, with a boy for engine and engineer, and a conductor waving his arm, represented both train and station. After the potatoes were loaded, the train went around the room to the Chicago freight depot, with its high platform, made of a gymnasium jumping-board. Here the depot man unloaded the potatoes. The commission house wagon then drove up and hauled the potatoes over to the commission house. The small grocer's wagon now came and carted the potatoes to the grocery store, where a customer came and bought some of them and carried them home. The grocer took part of the money that the customer had paid him and put it aside for rent, forgetting the other expenses and the profit. The rest he sent by his clerk to the commission man. This man kept part, and sent some to the man at the freight depot, in payment of the railroad charges, and the rest to the farmer. We did not then go on and have the freight man pay the engineer and the conductor, although they unexpectedly demanded it.

All the data for this play the children got on their excursion to South Water street. We worked on these data in class for several days, asking questions, explaining, discussing the need for these various persons and the disposition of the money. Together we followed the journey of one vegetable. Each child then chose some other fruit or vegetable, and, by a serial drawing, showed the process of bringing it from its source to its point of consumption.

During the year we hope to follow out, in the same way, some of the manufactured food products, like bread and meat.

OUTLINE FOR JANUARY.

On account of the emphasis that was necessarily put upon handwork during the short Christmas month, we shall continue, in January, the work begun in December in connection with the making.

French (Josephine Ashleman).—The third grade has been studying foods: their cultivation and distribution. For January the French will be in direct correlation with this study of foods, special attention being given to the buying and cooking of them. The schoolroom will be used at first as the grocery store, but when proficient in the names of staple articles, the children

will go to the nearest grocery and buy the supplies for the cooking department. Thus they will acquire the French system of measures and money values.

READING LESSON.

MIS EN SCÈNE: UN MAGASIN D'ÉPICÉRIE.

Personnages: Deux petits garçons, Pierre et Jean; l'épicier.

Jean. Bonjour, monsieur. Avez-vous de belles pommes, ce matin?

L'épicier. Oui, mon garçon. En voici, de belles rouges. Combien en voulez-vous?

Jean. J'en veux deux kilos.

L'épicier. Les voici. Un franc, s'il vous plaît.

Jean. Je vous remercie.

Pierre. Combien coûte ce fromage?

L'épicier. Quatre-vingts centimes la livre. C'est du fromage de Neufchâtel.

Pierre. Donnez-m'en une livre, s'il vous plaît.

L'épicier. C'est ça. Désirez-vous autre chose? Les œufs sont frais ce matin et les pommes-de-terre sont très bon marché.

Pierre. Je vous remercie. C'est tout pour aujourd'hui. Bon jour, monsieur.

Les deux garçons sortent du magasin portant les deux paquets.

Song, "Savez-vous planter les choux?" from *Vieilles chansons et rondes*, by M. Bontet de Monvel.

FOURTH GRADE.[1]

FRENCH.

LORLEY ADA ASHLEMAN.

IN connection with their manual training, the children of the fourth grade will dramatize "Les Outils de Louis XVI." The love this unfortunate king bore these tools will make them the most sympathetic *raconteurs* of his sad history. The pathetic life of Louis XVI., his love for manual labor, cannot fail to interest a child and to open the door for him into a French atmosphere. The tool, in its conversation, will use the verb the children themselves will have often employed in connection with it. If a strong desire is shown by the class to know more about this king and his queen, incidents in the history of their lives and of their reign will be enlarged upon.

[1] A complete outline for this grade will appear in the February number.

LES OUTILS DE LOUIS XVI.

La râpe. Quel ennui! quel supplice!

L'équerre. Qu'avez-vous donc, ma chère?

La râpe. Vous me demandez ce que j'ai! Puis-je me trouver heureuse, dans ce musée d'antiquités? Moi, qui ai toujours été habitué à polir, à unir les planches, je languis dans une oisiveté forcée.

La scie à tenon. Je le crois bien. Je n'ai pas scié une planche depuis que nous avons quitté le magnifique palais de Versailles. Si sa Majesté nous voyait ici, abandonnés, nous qui étions la joie de son cœur, que dirait-il?

La râpe. Que dirait-il de nous voir mourir dans ce misérable trou, après avoir fait le bonheur de son existence?

Le marteau. Il me semble rajeunir et enfoncer des clous quand je pense avec quelle joie le roi, dauphin alors, nous vit pour la première fois. Ah! ah! ah! ce fut moi qui attirai le premier ses regards.

Tous les outils. Oh! oh! oh!

Le tournevis. Monsieur le marteau, vous êtes aussi vaniteux aujourd'hui que jadis.

Le marteau. Vous pouvez rire autant que vous voudrez, monsieur le Tournevis. Je dis la vérité, vous le savez bien; je vous la martèlerai en tête.

Le maillet. Laissez le en paix. A quoi bon discuter avec un tel tapageur?

Le marteau. Prétendez-vous donc que le roi ne fît pas plus usage de moi que de vous tous?

La varlope. Cela se pourrait bien. Vous vous soumettez à n'importe quel travail; tandis que nous autres, plus raffinés dans nos goûts, nous ne nous prêtons qu'à certains travaux; moi, par exemple, je rabote toutes les inégalités.

La râpe. Vous avez mis le doigt sur la plaie.

Le marteau. Je ne discute plus avec des vaniteux tels que vous.

Le troussequin. Laissons là, tout parallèle blessant les uns pour les autres.

La lime. Il vous fait convenir que vous n'êtes pas aussi poli que nous.

Le vilebrequin. Ni aussi délicatement perfectionné!

La clef anglaise. Oh! ne nous querellons pas, après tant d'années d'intimité! Tâchons de passer nos derniers jours dans la concorde. Moi, ainsi que ma sœur la râpe, je n'ai goûté aucun bonheur depuis que je n'ai plus à serrer ou à desserrer les écrous du roi.

L'équerre. Je n'oublierai jamais quel plaisir il avait à se servir de moi pour tracer avec exactitude ses lignes et ses angles. La seule fois qu'il nous oublia fut le jour de son mariage avec Marie Antoinette.

Le tournevis. Elle se moquait bien souvent de nous, surtout de moi, lorsque, sous la main du roi, je faisais entrer les vis dans les trous.

La scie à chantourner. Elle ne pouvait comprendre, la fille de l'orgueil-

leuse Marie Thérèse, la passion du roi pour nous tous. Cependant que de jolis objets n'a-t-il pas taillés, évidés pour elle, avec notre concours ?

Le marteau. La pauvre femme ! Sa fierté subit beaucoup d'humiliations plus tard.

Le tournevis. Je me demande pourquoi le roi l'aimait tant ; elle ne s'intéressait point à ses travaux manuels. On dit qu'élle s'impatientait quand elle le voyait travailler, et surtout quand il se préoccupait des intérêts du peuple.

Le vilebrequin. Moi, qui perce des trous à travers le bois, la pierre, je crois avoir pénétré le cœur de cette reine. Elle voulait bien faire, mais, dans sa fierté, elle ne pouvait comprendre les souffrances du peuple ; elle ne pouvait comprendre qu'un peuple eût aussi des droits.

La scie à tenon. Je n'oublierai jamais l'expression du roi, le jour où il apprit le Serment du Jeu de Paume.

La scie à chantourner. Ce n'est pas étonnant quand on songe à ce qui s'ensuivit.

La râpe. Je n'ai jamais pu comprendre comment cela s'était passé.

La scie à chantourner. Comment ? Vous ne le savez pas ?

Le riflard. Si vous voulez, je vais de nouveau raboter et vous aplanir la question.

La râpe. Oui, je vous en prie ; cela me mettra de meilleure humeur.

Le riflard. On avait l'habitude dans les grandes difficultés de réunir les États-Généraux. Louis XVI, notre bon maître, incapable de trouver les moyens de combler la dette de ses ancêtres, avait décidé, sur la proposition de Necker, la réunion de ces États. Cette assemblée se composait de trois parties : la première, celle du Clergé, la plus puissante ; la seconde, celle des Nobles ; et la dernière, celle du Peuple ou le Tiers État.

La râpe. Cette question d'argent n'a-t-elle pas divisé les États-Généraux ? Le peuple n'a-t-il pas été en désaccord avec la noblesse et le clergé ?

Le riflard. Le tiers, par suite des opinions contraires, qui s'élevèrent dans les États, chassé de la salle commune, délibéra seul.

La râpe. Ah ! je sais ce qu'ils ont fait. Les députés ont trouvé ouverte la salle du Jeu de Paume, et s'y sont installés.

Le riflard. Ne m'interrompez donc pas. . . . . Ils firent là le serment de ne pas séparer avant d'avoir donné une constitution à la France. Leur fidélité à ce serment a en grande partie causé la Révolution française.

Le marteau. La reine, plus effrayée que le roi du serment du Jeu de Paume, essaya d'obtenir de Louis XVI qu'il réunît des troupes étrangères dans les environs de Versailles.

La scie à tenon. Le peuple ne l'aimait guère à cause de ses goûts extravagants.

La règle. La pauvre femme !

L'équerre. C'est que le roi la gâtait beaucoup. Il se laissait toujours influencer par elle.

Le tournevis. Louis XVI, en vérité, faible de caractère, avait un bon cœur. Je me souviendrai toujours de lui avec tendresse.

Le valet. Pour cela, oui, mais il n'avait pas la main assez forte pour maintenir l'ordre.

Le maillet. Vous souvenez-vous de l'hiver qui précéda la Révolution? Comme il fut bon pour les pauvres et comme il leur distribua des aumônes!

Les tenailles. Et son bonheur de donner à son fils le dauphin une table confectionnée par lui-même, où il avait dessiné sur le stuc la carte du monde entier.

La râpe. Vous vous souvenez bien que s'il avait quelque mécontentement, quelque gros chagrin, notre société l'effaçait bien vite.

La scie à chantourner. Comme il aimait ses enfants!

La scie à tenon. Je n'oublierai jamais sa tristesse à la mort de son fils aîné.

Le valet. Heureusement il n'a pas appris la triste fin de son autre fils.

L'équerre. Ce pauvre petit enfant de onze ans resta longtemps, comme la reine, emprisonné.

La râpe. Que c'était affreux de voir cette foule désordonnée assaillir le palais de Versailles. Je m'en souviens bien; j'ai vu tomber dans les bras du roi la reine, prête à sangloter.

Le tournevis. L'horreur fut encore plus grand quand ces mines farouches apparurent à l'intérieur de sa chambre.

Le maillet. Il semblait y avoir plus de femmes que d'hommes.

L'équerre. D'où venaient-elles?

Le maillet. Mais de Paris, qui est à une distance de vingt kilomètres; elles avaient marché toute la nuit.

Le tournevis. Je me demande comment on a pu arriver jusqu'à la chambre de la reine.

Le riflard. C'est fort simple. Le roi avait donné l'ordre à ses gardes de ne pas employer la force contre la foule. Quand celle-ci eût monté les grands escaliers, appelés escaliers de la reine, la garde se replia dans les appartements du roi, ce qui laissa l'appartement de Marie Antoinette ouvert.

La scie à tenon. La reine y était elle?

Le riflard. Oui, elle était dans sa chambre à coucher; elle n'eut pas le temps de la quitter.

L'équerre. S'est-elle sauvée?

Le riflard. Oui, elle réussit à sortir par une petite porte qui donnait dans les appartements privés.

L'équerre. N'est-ce pas que c'est triste de la voir dans la chambre du roi, entourée de ses enfants, regardant avec terreur dans la cour la foule qui demandait sa tête?

La râpe. Je crois que pour la première fois de sa vie elle comprit qu'elle n'était pas sacrée pour la foule de Paris qui en voulait, non au roi, mais à la reine.

Le marteau. On m'a dit que dans sa prison elle se montra fort brave, mais toujours hautaine.

Le ciseau. Louis XVI, comme Marie Antoinette, ne manifesta aucune crainte. Il fut désolé de voir tournée contre lui la colère de son peuple pour lequel il avait toujours fait le bien autant qu'il le comprenait.

Le marteau. Une chose me fait grand plaisir; c'est de voir la reine, toujours si égoïste, entourer le roi, après son emprisonnement, de tant de tendresse et de tant d'affection.

La scie à chantourner. Qui ne serait touché de son désespoir à la mort de Louis XVI?

La varlope. Heureusement il ne savait pas que, quelques mois plus tard, la reine devait, comme lui, monter les marches de la guillotine.

La râpe. Vraiment, je deviens toute triste quand je songe aux souffrances de ce pauvre maître. J'ai honte de m'être plainte de ma vieillesse et de mon abandon, car je ne suis pas la seule qui ait souffert de cette terrible révolution.

FIFTH GRADE.

HARRIET T. B. ATWOOD.

REVIEW FOR NOVEMBER.

History.—After listening to the reports given by the different children on the weaving done in early New England homes (see review for October), a closer investigation of the colonial period of New England was begun. The children were first asked to picture the scene of the "Mayflower's" landing. Each child contributed what he could, either orally or by a blackboard sketch; selections bearing on the point were read from Drake's *On Plymouth Rock* and Austin's *Standish of Standish;* pictures of the harbor, the "Mayflower," the people, their possessions aboard, the ship, were studied; the geographical points of interest were located on a relief map of North America and on a chalk-modeled map of Massachusetts drawn to a larger scale. A brief consideration of the motives which brought these people from their homes in England followed, the organization of the government of the little community was considered, the building of the town described, and selections were read from Bradford's *History of Plymouth Plantation* and from Fiske's *Beginnings of New England.* The children used Nina More's *Pilgrims and Puritans*, Drake's *On Plymouth Rock*, and Guerber's *Thirteen Colonies* for reference books.

Next, a study was made of the home life and occupations of the people during the first years of the colony, their ways of lighting, heating, cooking, farming, hunting, fighting, and dressing. The influence of the topography, soil conditions, climate, flora, and fauna upon the people's manner of living was considered, the geographical data being gathered from personal experi-

ences of some of the children, from pictures, maps, and selections from Tarr and McMurry's *North America*, Frye's *Geography*, and Powell's *Physiographic Features of the United States.*

Literature, oral reading, dramatic art.—The reading of Longfellow's *Courtship of Miles Standish* was continued, and Austin's *Standish of Standish* begun.

The part of the fifth grade in the Thanksgiving festival was the dramatic representation of the "First Thanksgiving in America" (see Miss Fleming's outline in the December issue). The children planned their own drama in a general way, after which each child wrote out in detail his idea as to what each scene should consist of. A study was made of the costumes of the Pilgrims and of the Indians. Each child made his own headgear, *i. e.*, Puritan hat, Puritan cap, Indian headdress. The other portions of the costumes had been saved from a previous year, and needed only to be refitted. Guns and swords were loaned by the children throughout the school, and extra drill in marching, firearms, racing, jumping, wrestling, and arrow-shooting was given by the physical training department.

Home economics.—Cooking of coddled apples, canning of pears, making of filling for pumpkin pies. The latter was planned in connection with the study of Puritan cookery, and the pies were used for the Thanksgiving feast. (The pie-crust was made by the sixth grade.) After the festival, the children of the two grades invited their parents and friends to the home economics room, and served them with the grape juice, canned fruit, and pumpkin pie of their own making.

Nature study and geography.—On the morning of November 19 an unusually dense fog covered Chicago, lifting at about 9:30 A. M. The children came to school excited over their experiences. Traffic was delayed, and narrow escapes from collision were common. When the question was raised as to what the substance was which obstructed their view, the first answers were the common terms, mist and fog. After a closer review of their experiences, the children decided that the substance was really water, since it wet their clothes and faces; moreover, that it was a cloud, such as those more commonly seen in the upper air. Personal experiences of going above the clouds in ascending mountain peaks, and of watching clouds form about such peaks, were given, and pictures of clouds were studied. The children were asked to watch their teakettles at home, and to give reports of what they observed. Since that time, records have been kept of different kinds of clouds observed.

During the storms which have occurred the children have been encouraged to speculate on what was going on to cause the fall of the rain or snow. Possible experiments to illustrate these phenomena are being planned by the children.

The children planned to correspond with school children in Norway and India, exchanging observations relative to the landscape, the position of

the sun at sunrise, noon, and sunset; the length of day and night, the range of temperature, and other seasonal observations. The observations which will be sent to these foreign countries have been recorded.

Geography.—In addition to the study of New England (see "History" above), the wool industry of North America was investigated. The children experimented with carded wool to see how it was twisted into yarn. They discovered that there were great differences in the length and quality of the fibers of different kinds of wool. It was found that they had very crude notions of the reasons for such differences, and knew very little about the different kinds of sheep and the ways of caring for them. The class was divided into committees, and went to the library and the museum to look up such topics as, why sheep can graze so closely, what are the different kinds of sheep. A trip was made to the Stock Yards on "sheep day," and the children saw sheep from many parts of the world. They had opportunities to watch the weighing and dipping of sheep, to handle and examine the wool, and to sketch the sheep. In the lesson which followed, the children's observations were summed up and more finished sketches were made. The children then discussed the questions of where sheep might find a living in North America; the effect of sheep-raising upon agriculture; the relative importance of sheep-raising to other industries of the United States. For home work they read, at various times, all they could find in Tarr and McMurry's *Geographical Reader of North America* on sheep-raising and the wool industry, and reported on the same in class. The states where sheep-raising is a prominent industry were located on a relief map. The principal woolen manufacturing towns were also located and reasons for their location considered.

Mathematics (see November issue).—The problems used in November were as follows: (1) Finding average weight of sheep when the weight of a herd of given size was known (data obtained at Stock Yards). This involved the proper recording of data and a review of long division. Mistakes were made in recording the number of pounds given by the weighers at the Stock Yards; therefore on the return to school drill was given in the writing of numbers from dictation. (2) Reduction of recipes for given numbers of persons to individual recipes, for use in cooking class; as, for example, cocoa for four persons: 2 cups of milk, 1½ tbsp. cocoa, etc.; for one person: ½ cup milk, ⅜ tbsp. cocoa, etc. Owing to the fact that multiplication of fractions was not thoroughly understood, the children lost much time in working out their recipes. The hours for mathematics were therefore spent in reducing recipes, solving problems involving similar processes, and in developing the laws governing the multiplication of fractions.

The children also made careful working drawings of the articles to be made in the shop. These drawings are made to a definite scale, and the dimensions are placed upon them. They are then kept by the child in his locker, to be referred to when necessary.

Manual training.—Making of Christmas gifts. Among the articles which have been begun are coat-hangers, footstools, bread-boards, paper-knives, button-boxes, and waste-baskets.

French (Lorley Ada Ashleman).—The game "La mer est agitée" was learned and played as in the third and fourth grades. (See January outline, fourth grade.)

The children wrote in class, from memory, the "Fisherman's Call." Each child illustrated one of the fish. The playing of the game gave rise to many sentences which were written on the blackboard as they were needed:

Vous êtes le homard.

Mettez les chaises comme ça.

Prenez les petites chaises.

Mettez la dans le coin, etc.

The children have begun to read the little fairy tale "Le Pêcheur et sa femme."

OUTLINE FOR JANUARY AND FEBRUARY.

Nature study.—(1) Investigation of the winter condition of plant life. Painting of the winter landscape. (2) Study of animal coverings and of our own winter clothing. Experiments in physics to show which fabrics conduct heat readily and which are, relatively speaking, non-conductors. (3) Recording of changes which have been observed in slant of sun's rays at noon, by stringing wire upon a model made to represent the portion of land and water seen from some such point as the roof of Ryerson Physical Laboratory.[1] (4) Experiments to show relative amounts of volatile matter and ashes contained in different varieties of coal. (See "Geography" in this outline).

REFERENCES: *World's Work*, December, 1901; Allen, *Vignettes from Nature;* Hinton, *Life in Nature;* Martin, *Human Body.* See also references under "Geography."

Music.—"Ring Out, Wild Bells," "Welcome, Wild Northeaster," *Modern Music Series*, Book II; "Winter Song," three-part round, *ibid.*, Book I; "A Snowy Day," *ibid.*, Book III; "Winter Song," *ibid.*, Book I.

History, clay-modeling, industrial art.—(1) Weaving: Work on table cover designed in October (see October review in December issue). A study of the spinning and weaving of colonial times. (2) Study of the settlement of Virginia: story of the first settlement; geographical conditions; influence of the geography upon (*a*) the first settlement of the region, (*b*) the later development of the region; character of Virginia colonists and their motives in coming to America; the home life and occupations of the people during the first years of the colony; study of a few typical Virginian plantations; comparison of the old Virginia county with the New England township.

[1] Upon a disk of wood, made in the shop, will be drawn a bird's-eye plan of the above view. A semi-circular piece of pasteboard, intended to represent the plane of our meridian, will be glued in position, and wire strung from the point of apparent sunrise through the point where the sun crosses the meridian to the sunset point.

(3) Clay-modeling: decoration of schoolroom walls with bas-reliefs representing typical scenes in colonial times, such as a spinning scene; Miles Standish and his army; scene in a school in Washington's day; work on a tobacco plantation.[1]

REFERENCES: Fiske, *Civil Government of the United States; Old Virginia and Her Neighbors*, Vol. II, pp. 174–269; Doyle, *English Colonies in America*, Vol. I, p. 185; Lodge, *English Colonies in America*, pp. 1–92; John Smith, "The True Relation," *American History Leaflets*, No. 27; Earle, *Home Life in Colonial Days;* Thackeray, *The Virginians;* Coffin, *Old Times in the Colonies;* Guerber, *Story of the Thirteen Colonies;* selections from Churchill's *Richard Carvel.*

French (Lorley Ada Ashleman).—The work of the fifth grade in French for January will be correlated with history, as outlined in the next paragraph by Mrs. Atwood. The principal phase of it will be the dramatization of the trip of La Salle from Chicago to the Gulf of Mexico. (See Vol. II, No. 1, ELEMENTARY SCHOOL TEACHER AND COURSE OF STUDY, p. 88.)

A study of the early French settlements in America; geography of Canada; stories of Verrazano, Cartier, and Champlain; cause of settlement, the fur trade, the Jesuits; the first settlements; story of Marquette and Joliet; La Salle; comparison of French and English colonies in America.

REFERENCES: Parkman, *La Salle and the Great West;* Drake, *Making of the Great West; Harper's Monthly*, Vol. LXV; Catherwood, *Story of Touty;* McMurry, *Pioneer Stories.*

Manual training.—Making of games. (This work will be outlined in detail in a later issue.)

Geography.—(1) A study of the Atlantic coastal plain of North America in connection with the study of the people who settled there; the form and extent; eastern boundary or coast line; western boundary or fall line; topography; character of soil and underlying materials; rivers; climate; natural resources; settlement and development of the region. (2) Distribution of industries of North America (continued). (3) Fur-trading industry;[2] visit to fur departments of some of our large stores; location of regions from which the furs seen were obtained; study of the fur-bearing animals; visit to the Field Columbian Museum; methods of obtaining furs; treatment of furs; fur-trading centers of North America; present fur-trading industry; the fur trade in the time of early French settlement of North America; growth and development of the industry. (4) The coal and iron industries; visit to Field Columbian Museum; location of great coal and iron mines of this country; relation of the two industries; geography of the mining regions; methods of

[1] The children will select their scenes and make careful sketches of the same before beginning work in the clay. They will be given opportunity to consult books and pictures in order to make their sketches historically correct.

[2] This work will be taken up in connection with the history of French settlement of North America (see "French" in this outline), and in connection with the study of animal coverings (see "Nature Study" in this outline).

mining; preparation for the market; annual output of coal and iron in the United States compared with that of other countries; influence of these industries upon (*a*) the mining centers, (*b*) the country as a whole.

REFERENCES: "Commercial Relations of United States" and "Review of Worlds Commerce," Reports of Department of State, Washington, D. C.; Greenwood, *Steel and Iron;* Mill, *International Geography;* Powell, *Physiographic Regions of the United States;* Shaler, *Nature and Man in America;* "North America," *Carpenter's Geographical Readers;* Tarr and McMurry, *North America;* Adams, *A Commercial Geography;* Chase and Clow, *Stories of Industry;* Greene, *Coal and Coal Miners.*

Cooking.— January and February will be spent chiefly in the study of the cereals. The principle of starch cookery will be given, and breakfast cereals will be prepared. Rice and hominy will be used; white sauce will be made, and combined with milk and a vegetable will furnish a soup for luncheon. In connection with the cooking, a special study of wheat will be made, and a comparison between it and other grains will be begun. The geographical distribution of the cereals, primitive and present methods of preparing them for food, their storage and transportation, are some of the topics to be considered. A visit to a flour mill will be made, and the milling of the grain studied.

Physical training (Carl J. Kroh).—Cultivation of ease of movement, form, and grace, through sequential practice orders leading to definite gymnastic exercises, as front, flank, and back vaults over vaulting apparatus of different heights; forms of climbing; circling under and over beams and bars; emphasis of conscious effort through development and illustrations of progressive difficulties in free-standing, marching, hopping, and running exercises; comparisons of group work; monthly illustration and review at morning exercises by boys of the grammar grades, of current practice order, including games and plays.

FIFTH GRADE.

(FRANCIS W. PARKER SCHOOL.)

WILLARD STREETER BASS.

REVIEW FOR NOVEMBER.

History.—The work in history was the story of the Pilgrims, from their departure from Scrooby to the end of their first year in America. The reasons for the Pilgrims' leaving England and then Holland were made clear; the narrative of their journey across the Atlantic, their search for a home in the wilderness, the sickness of the first winter, their treaty with Massasoit, the success of the labors of the first summer, was told. The work of the

month culminated in the dramatic representation of the first Thanksgiving Day.

The two scenes of the play were planned by the children, though considerable assistance was given them in working out the details of their plan. The first scene represented the preparations for the feast, and the second the welcoming of the Indian guests to the feasts by the governor, a drill of the Pilgrim army under Miles Standish, contests between the Indians and the whites, and, finally, one dinner of the three-days' feasting. The following dialogue for the first scene was adapted, with the assistance of the class, from several sources, principally Jane J. Austin's *Standish of Standish:*

THE FIRST THANKSGIVING DAY.

DRAMATIS PERSONAE.

Mistress Brewster, Mistress White, Elizabeth Tilley, Mary Chilton, and Priscilla Molines.

SCENE I.

(A kitchen in Plymouth. Table in center, at which Priscilla and Elizabeth are preparing turkeys for cooking; fireplace at left, at which Mary is stirring a kettle. Mistress Brewster and Mistress White are seated on a bench at right peeling pumpkins for pies.)

Priscilla. O, if I only had some chestnuts to stuff these turkeys with, they would taste more like their brethren across the seas.

Mary. But their flavor is finer than our geese used to be, and here is one which will scale well-nigh twenty pound.

Elizabeth. Why don't you stuff them with beech-nuts? There is a store of them at our house.

Priscilla. Why, that will be fine; go and fetch some. [Exit Elizabeth.]

Mary. Priscilla, how are you going to cook the oysters?

Priscilla. In Leyden we used to cook them with bread crumbs and milk, but here we have no milk and no bread; I shall use biscuit crumbs and wine.

Mary. I have some scallop shells. Why not fill these with your compote, and roast them in the ashes?

Priscilla. A noble idea. We can put one at each man's place at the table.

Elizabeth (enters, carrying beech-nuts). O, have you heard the news? King Massasoit and all his braves are coming to the feast tomorrow. All your cooking will be needed.

Mistress White. How providential that the Indians have always been so friendly to us.

Mistress Brewster. Yea, the Lord hath been very good to us.

Mistress White. Verily hath he, Mistress Brewster. This is a happy summer, after all our trouble.

Mistress Brewster. See our pleasant houses, and the corn on the hill. We have happy homes here already.

Priscilla. But, oh, Mistress White, how unhappy were we this past winter with the hunger and the cold and the sickness and the unfinished houses.

Mistress Brewster. Ay, Priscilla; often did I wish for old England; its fertile fields, its merry villages. This is a cold and desolate land.

Mary. Truly! Only empty forest and desert sea all about us. There is little to talk about and less to laugh about. But I think that happier times are coming.

Mistress Brewster. Yes; our homesickness is over. We have houses; the earth smiles with harvest; the Indians are our friends. The hand of God is spread over us to keep us.

Elizabeth. But, best of all, here is no king to persecute us, to say: "I am the Lord's anointed. Think as I think; worship as I worship." We walk in the light of our own hearts.

Mistress Brewster. Verily, Priscilla, our blessings are manifold. It is exceeding good that tomorrow we give thanks unto the Lord.

Geography.— The main work of the month was the endeavor to give the pupils an image of North America as a great land mass. The experience of various pupils who had traveled was made the basis of the work. One or two pupils had been to the Pacific, and more than half the class had seen the Atlantic. By putting the first-hand knowledge of several pupils together we found that the country for a day's ride east from Chicago, and for a day and a night's ride west from Chicago, is a flat prairie, and that beyond these distances there are in the east low mountains and the ocean, and in the west two ranges of high mountains and the ocean. These facts, as they were developed, were represented first by the teacher and then by the pupils in chalk-modeling, sand not being available at the time.

The picture of an east-and-west section of the continent, thus obtained, was extended to the north and the south, mainly by means of facts stated by the teacher, and a rough map of the continent was modeled by the class. Such names and places as were already familiar to the class were located upon this map.

In connection with the work in history, a description of the country around Plymouth was given, and the class discovered the reasons which led the Pilgrims to select that place for their town.

Nature study (fifth and sixth grades).—The class undertook to have a window garden by raising plants from the seed. Each pupil received two flower-pots, chose two kinds of seed, prepared the soil, and planted the seeds, and had entire care of his own plants. The seeds have, in general, come up very well; dwarf asters, verbenas, cosmos, and forget-me-nots, all seem to thrive, but they are all eclipsed by the dwarf nasturtiums. The class made

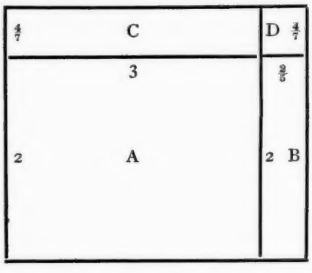
records of the date and method of planting the seeds, and are making occasional paintings of the seedlings in various stages of their growth.

A series of experiments upon air pressure was conducted that culminated in the principle of the barometer. The experiments were designed to show: (1) the downward pressure of the air; (2) the upward pressure of the air; (3) that air presses equally in all directions; (4) that the downward pressure of the air will raise water to a height of more than twenty-five feet; (5) that the pressure of air will support a column of mercury about thirty inches high. The instructions for these experiments were given orally, and the pupils performed the work individually, discussed the results in class, and, lastly, made a record of what they had done, what they had observed, and the reason why it happened.

Simple apparatus, with directions for these experiments, is described in Hammel's *Observation Blanks in Physics.*

Number (fifth and sixth grades).—Since the members of the class became aware in October, in obtaining the area of a square rod in square feet, both of the necessity of multiplying a mixed number by a mixed number, and of their inability to do so, considerable time has been spent in learning this process. The method used in learning it has been that suggested by the problem which first disclosed the necessity for the operation. The two numbers the product of which is desired are represented as sides of a rectangle, and the area of the rectangle is found by dividing it into four rectangles corresponding to the four partial products of the multiplication, and the areas of which can be readily found. The partial products, which are usually things of mystery to the pupil, thus assume their true significance, and no part of the process can subsequently be overlooked. Of course, after the pupil has become familiar with the process, he ceases to draw a figure with each problem.

The following is a problem solved by this method: Find the area of a rectangle $3\frac{2}{5}$ rods long by $2\frac{4}{7}$ rods wide:



Solution: $3\frac{2}{5}$ sq. rds.

$2\frac{4}{7}$

$3\times 2=6$ sq. rds. = area of rectangle A

$\frac{2}{5}\times 2=\frac{4}{5}$ " " = " " " B

$3\times\frac{4}{7}=1\frac{5}{7}$ " " = " " " C

$\frac{2}{5}\times\frac{4}{7}=\frac{8}{35}$ " " = " " " D

$8\frac{2}{35}$ sq. rds. = area of whole.

French (Josephine Ashleman).—The work in French for November was correlated with the number work. At the end of the month we sent, for

correction, five problems relating to the measurement of our hall and schoolroom to the fifth grade in the University Elementary School. We received, in return, a French fruit game that is played somewhat like the game of authors. Letters of acknowledgment were exchanged.

OUTLINE FOR JANUARY.

History.— Virginia: the story of her founding, a study of her social and industrial conditions, and a comparison with those of New England. Love of adventure and wealth furnishes the keynote of early Virginian history. The story of Jamestown will be told to the class as a great adventure, and the life of Captain John Smith as that of a great adventurer. The industrial condition will be studied by making as vivid a picture as possible of life on a great plantation The points to be made most prominent are: (1) the staple product; (2) climate and soil necessary for the production of tobacco; (3) labor required; (4) method of marketing the crop; (5) other occupations, *e. g.*, spinning and weaving, pursued on the plantation. The resulting social conditions will be noticed and compared with those of New England, where there was no staple product, in regard to (1) division of society into classes, (2) towns, (3) schools.

REFERENCES: Fiske, *Old Virginia and Her Neighbors*, Vol. II, pp. 174–269; John Smith, "The True Relation," *American History Leaflets*, No. 27; Coffin, *Old Times in the Colonies;* Katherine Pearson Woods, *The True History of Capt. John Smith.*

French (Josephine Ashleman).— The French for January will be correlated with American history — the period of French explorations and settlements. The story of La Salle's trip to the Gulf of Mexico (see COURSE OF STUDY, Vol. II, No. 1) will form the reading lesson.

Geography.— Atlantic coast plain, especially Virginia; comparison of topography with that of New England, particularly in regard to soil, navigable rivers, waterfalls, and industries.

Study of the wool industry; the grazing habits of sheep; the distribution of sheep in North America. The fur trade: its methods and importance.

Letters were written in December by the pupils to the pupils of a school in North Carolina, describing the winter condition of the trees, the ground, the position of the sun, the length of day, etc. It is hoped that answers to these letters will be received in January, and that the pupils will so be enabled to build up a picture of the winter condition in more than one section of the continent.

REFERENCES: Tarr and McMurray, *North America; North America* ("Carpenter's Geographical Series"), pp. 140 ff.

Nature study.— Weather records, as in previous months, continued. Care of window gardens continued. Study of winter condition of plants, and the methods of branching of various kinds of trees, by landscape painting. Study of the coverings of various animals: fur, wool, hair, feathers, etc.;

how these are adapted to conditions in the animal lives, and how man adapts them to his own needs. Vaporization and condensation of water; snow.

REFERENCES: (See December number.)

Number.— Continued along the same lines as last month.

Clay-modeling.— Making of placques, modeled in low relief, of scenes from colonial life or from colonial occupations.

Manual training.— Making of a loom described in COURSE OF STUDY, Vol. I, No. 2, pp. 144, 145.

SIXTH GRADE.

JENNIE E. CURTIS.

REVIEW FOR NOVEMBER.

Geography and history.—We assumed that one-half of the children in the grade was a certain tribe of Indians living in the Mississippi valley, and that the other half was another tribe whose home was also in the same valley. The two tribes we called tribe number one and tribe number two.

Tribe number one has corn enough left over from the fall gathering, so that it does not feel the necessity of moving to new hunting-grounds for the sake of food. This gives its members leisure to improve their wigwams, make pottery, and do decorating.

The next season the tribe profits by its experience of the year before, and plants more corn, in order to have food for the winter, pitches its wigwams with larger and better posts, and covers them with more and better skins for protection from the winter's cold. Thus it is learning to improve its architecture, and is developing art through making pottery and decorations.

But the comfortable condition of tribe number one excites the jealousy of tribe number two. The latter invites a third tribe to join it, and together they sweep down on tribe number one. They drive it away, and spend the winter in its comfortable home, eating its corn and using its pottery.

What is the effect on tribe number one? Will the next wigwams it pitches be just as good as those from which it has been driven away? Will its members work just as hard the next year at planting corn? Will they have as much time to spend in decorating?

The pupils were asked to look at a map of North America and find a place where these Indians could go and live undisturbed. They chose mountainous regions, Mexico, and small river valleys as good hiding-places easily defended. The open Mississippi valley they considered a place too easily attacked. The teacher drew a relief map of Mexico on the blackboard, and the children modeled Mexico in sand as an example of a country offering "nest places" for hitherto wandering tribes. "Nest places" were

understood to be places easy of settlement, where the tribes could make their homes and be safe from capture by nomadic tribes. The pupils studied a relief map of Eurasia and Africa, and selected places suitable for tribal settlement. They chose Greece with its protected river valleys as typical of countries that would foster primitive man. The open plains of Russia they thought it would be difficult to defend, and that in them agriculture, architecture, and art, *i. e.*, civilization, would, in consequence, develop slowly.

A large putty relief map of Greece was laid on the floor so as to correspond with the cardinal points. The children pointed in the direction in which the real Greece lay. They looked up the routes to Greece on maps and globe, modeled Greece in relief in sand, and located places. The first five stories in Guerber's *The Story of the Greeks* were read to them by the teacher. In *Ten Boys on the Road from Long Ago till Now*, by Jane Andrews, they are reading the story of the Greek boy; and they are practicing Greek games under direction in the gymnasium.

In Asia, the class selected China as a type. The children located it by giving directions on the earth and looking up routes of travel to China on globe and maps. They modeled it in sand and, at the same time, talked of its slope and drainage.

The geography of current events formed part of our work.

Art.—We studied many pictures of Greek statues and answered the questions: Why were the Greeks physically more beautiful than other peoples? Why did they make statues? We visited the Art Institute, and compared the work of the early Egyptians, Assyrians, and Greeks. Each child drew the statue that pleased him most, and later drew it on the blackboard at school, looked up its story in the library, and next day told it to the class.

In clay, the pupils are modeling dishes which are to be used for their luncheons.

Literature.—The grade read the story of Dionysus, which is the Greek Thanksgiving festival, for the purpose of dramatizing it for our Thanksgiving celebration.

Nature study.—The children made a weather chart, on which they keep a record of the daily temperature, the direction of the wind, and the amount of sunshine.

To discover the direction of air currents, (1) we built a large bonfire and threw in paper and dried leaves. Surface currents were found flowing from all directions toward the fire. Over the fire there were found to be rising currents, which flowed outward and gradually settled toward the earth again. (2) We soaked paper in a strong solution of saltpeter, dried it, touched a lighted match to it, and held it near the radiator to see the direction of the smoke. After other similar experiments, we reached the generalization that near all bodies of heat there is the same circulation of air as around the bonfire.

Next month we shall take the equator as the region of the greatest heat and study the winds of the earth, especially those of Eurasia.

NOTE.— The outline for the sixth grade for December will be completed in January. The usual outline for this grade is, therefore, omitted from this number.

SEVENTH GRADE.

NOTT WILLIAM FLINT.

REVIEW FOR NOVEMBER.

NATURE STUDY.

THE outline for this work — how animals spend the winter — appeared in the December number of the ELEMENTARY SCHOOL TEACHER AND COURSE OF STUDY. This review for November covers also part of December:

We approached the subject from the point of view of the season — a class discussion of the restrictions winter lays upon all life. Each child was asked to write a paper overnight on how some animals, or some one animal, he knew about, prepares for and spends the winter. Out of the class of fourteen, two forgot to write at all, one wrote about the human animal, and eleven about wild animals. Of these latter, the bear and the squirrel were favorites. Not a word, however, was said about insects, birds, batrachians, and fishes. From these papers, read aloud in class, we drew out and noted these facts: Some animals change their clothing and heat their houses; some store up food and lie close; and some sleep through all or a part of the winter. When questioned about the birds, the children objected that they had not thought of birds as animals; further, they knew, they said, that birds always go south. About the insects they kept silence, apparently because, owing to the winter habits of these creatures, they knew nothing of them.

To find out about insects, the class took a field trip into near-by vacant lots, and found and brought back larvæ and insects of various kinds. These they had discovered in the interstices and between the bark and the boles of trees; on the under side of stones, bricks, turf, and bits of wood; in the branches of trees and beneath the matted grasses. Being now satisfied as to how, in general, "bugs" get through the cold weather, each child wrote up his account in a short paper, and painted a picture showing the winter home of some particular insect.

As to the birds, however, the method of direct observation could not be used; the class must get its experience at second-hand. So the teacher got from the library fourteen different books about birds. Then, in a class discussion, he drew out seven questions which the children thought must be answered if they were to know about the winter habits of birds: (1) What is

migration? (2) What causes birds to migrate? (3) How do birds find their way when migrating? (4) What birds migrate? (5) When do birds migrate? (6) Do all birds migrate? (7) What birds stay at home? It may be said here, by the way, that in hammering out these questions and in wording them the class fell into dispute as to the difference in meaning between the words "migrate" and "migration." The three succeeding recitations were given up to a review of the parts of speech; the children made definitions of the terms used, and then endeavored to distinguish the parts of speech in one student's theme written on the board.

Then, going back to their subject, the class members wrote the questions out, giving each a place to itself in their notebooks. At this point the teacher told the class that he would give each member every day a different library book about birds, that somewhere in the book there was specific information on at least one of the seven questions, and that each student must find that information for himself, enter it under the proper heading in his notebook, and keep the references to page and author. When asked how they would set about such work, two of the class said they would use the index, eight would use the table of contents, and two thought they would just turn over the pages till they found what they wanted.

The books were given out and changed each day. At the end of nine or ten days the teacher gathered in the notebooks. Nine children had their seven pages filled with notes and references, two had done about half as much, and two more had done practically nothing.

We then discussed, or tried to discuss, the various findings in class, but there was so great a conflict of opinion, backed up by authorities, that the discussion inevitably became uproar. So we wrote all the different answers to one question, "What causes birds to migrate?" on the board. The list read: (1) Desire to go to a warmer climate; (2) instinct; (3) lack of food; (4) cold and a lack of food; (5) inherited habit; (6) continuation of a habit formed during the glacial period of North America. The possible superiority of one authority over another the children had no conception of — each answer they had found in a book, and to them one book was as good as another. The class suggested a way to choose among these six answers: it was quite satisfied to adopt that answer which had back of it the greatest number of authorities. One boy, however, noticed that some of the answers overlapped in meaning, and then the class fell to scrutinizing more closely the whole list.

After a slight analysis and a consultation of the dictionary, they all decided that "instinct" and "inherited habit" were too names for the same thing. Also, they saw clearly enough that, if a habit of migration had been formed in birds during the glacial period by the seasonal movement back and forth of the ice-sheet, practically the same seasonal conditions exist now. Lack of food, they finally said, would be the most compelling cause of migration, although they saw and pointed out that lack of food for the birds was

caused by the cold weather and the snow. And so the class worked out a common unity for itself in this matter, and agreed that the underlying cause of migration is a change in temperature.

The teacher then asked the children to write up their notes into five paragraphs, taking as a subject for each paragraph one of the five questions. It needs to be said here that all the answers to questions four, five, and six were mere lists of birds, together with their seasons of migration, copied out of the various books; so these had by now been made into one question. This work, however, the children did as a very heavy chore, for they felt that, so far as they were concerned, these questions were quite settled; and the desire to get their notes into presentable literary form was not to them just here a keen desire. They saw in it nothing more than an exercise set by the teacher, and as such they did it.

About this time the grade was due to give a morning exercise for the benefit of the whole school. After talking the matter over, the class decided to present some of the things it had learned about birds. Two considerations guided them: they wanted to be interesting, and they wanted to do something which the kindergarten children could understand; they felt that too many of the exercises went far above the heads of the little children. So they determined that each member of the class should represent some bird — a bird which could be had from the shelves of the school museum — tell a few significant facts about this bird, or perhaps a story, and then ask the kindergarten, or some one of the lower grades, to guess what bird. The bird itself was then to be exhibited to the whole school. Here was a chance for the teacher of English. The children were quite willing to write and rewrite what they were to say in morning exercise, for here they had, strong in their minds, the necessities of their audience.

It had been planned to have as oral reading on this subject Seton-Thompson's "Redruff," from *Wild Animals I Have Known*, and Longfellow's "The Birds of Killingworth," but "Redruff," and the other piecemeal reading they had, proved as much as the class could do in the time.

SEVENTH GRADE.

(FRANCIS W. PARKER SCHOOL.)

HENRY T. MORTENSEN.

OUTLINE AND REVIEW FOR FIRST QUARTER.

UP to this time nothing has been printed concerning the work of the seventh grade in the Francis W. Parker School. Much of the work in the different subjects centers upon the arts of bookbinding and printing, as does that of the seventh grade

in the University Elementary School, but it is being worked out quite differently.

History and geography.— The guild idea, which is at present a subject of discussion with the arts and crafts societies, is being partially worked out. For various reasons, the arts previously mentioned were selected for this grade. They present, in a different aspect, the same problems as the fifth grade is attempting to work out in its study of our colonial history, and the sixth, in its study of Grecian history. These arts also require a degree of skill and strength not possessed by children much younger than those of the seventh grade. To understand the guilds, their origin, and the period of their existence, the children must study the history of mediæval Europe. This will lead them back to the invention of printing and forward to the present forms of bookbinding.

The pupils have not the skill, at present, to bind books in the regular form, but they will begin by binding a notebook in which to keep a record of what they are doing in cooking. As they become more proficient, they hope to bind books for the other grades, as well as reading lessons and magazines for the library of the school.

The geography of certain parts of Eurasia was demanded as a setting for the work in history. These parts were studied in detail, but the general idea of the structure of the continent, and the relation of this part to the whole, was obtained through the use of sand maps, relief maps, chalk-modeling, pictures, and books.

The seventh grade follows and reports to the school the current events of interest in Eurasia, such as the trans-Siberian railway, Russian occupancy of Manchuria, the adoption by China of western civilization, the progress of Japan, and other subjects of present interest. The current events of Eurasia were chosen for this grade because it was already studying that continent.

Each grade of the school is studying some one of our great national industries and exports. The animal industry was selected for the seventh grade because of its relations to the work of the year. The pupils study hides and their preparation for use in the bookbinding. In their cooking, they study the preparation of the meats for food. A review of the geography of North America will be necessary while the children are studying meats as articles of export.

The children will each tan a piece of leather under the following general directions: Wash the hides first in clear water, and then immerse them for six to ten days in a solution of lime and water. When the hairs have loosened sufficiently, scrape them off. Place the cleaned hides in a bath of tannic acid until the acid has penetrated them. To test whether or not the hides are tanned, cut off a small piece and see whether the freshly cut edge is all of one color. The length of this process depends upon the strength of the

solution used. As this work progresses, accounts of it will appear in the ELEMENTARY SCHOOL TEACHER AND COURSE OF STUDY.

Nature study.— Weather maps, recording temperature, winds, rainfall, etc., are being kept. They will help the children in understanding the climate and climatic changes in the parts of the world about which we study.

Number.— The number work, up to the present, has been largely to ascertain the abilities of the pupils, and to give individual help to those in need of it. Drill in the processes involved in percentage has also been given, to enable the children to handle the problems that they meet with in their other work.

Manual training and clay-modeling.— The manual training and clay-work has consisted entirely of the making of Christmas gifts.

EIGHTH GRADE.

KATHARINE M. STILWELL.

REVIEW FOR NOVEMBER.

MATHEMATICS.

THE mathematics in the eighth grade during November consisted in measuring and making drawings to scale of the school-room walls. These drawings are to furnish a basis for the decorative designs to be put upon the walls.

The following plan for teaching was prepared and the work was carried out by Miss Agnes M. Tuttle, a member of the first-year pedagogic class. In teaching, Miss Tuttle has not been able to accomplish all the work planned, as the measurement of the inaccessible distances proved to be a difficult problem for the class and required much time. However, the pupils succeeded in solving it. The work will be continued and the drawings made under the direction of the regular teacher.

MOTIVE.

The motive of this plan is to supply mathematical data for use in the decoration of the class-room.

APPARATUS AND MATERIAL.

Paper, pencil, ruler, tape, meter or yardstick, plane-table, alidade, plumb-line, flagpoles, T-square, thumb-tacks, ink, drawing pen, cross-staff or bar.

The plane-table consists of a flat-topped camera tripod, to the top of which a light drawing board is screwed. The alidade is made of a foot-rule

carrying two needles or pins for sights (see Fig. 7, COURSE OF STUDY, Vol. I, No. 6, p. 667). The cross-staff consists of a light stick about three feet long (a meter or yardstick), carrying a nail-sight at one end (the eye end) and provided with another stick, which, held at right angles to the first, slides easily back and forth along it. The cross-stick should be supplied with three or five sights (*S 1*, *S 2*, etc., Fig. 1), one at each end and a third in the middle. The cross-bars should be at least two feet long.

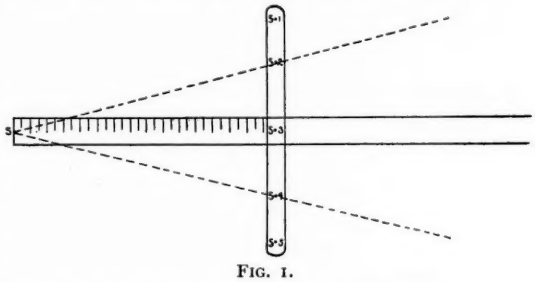


FIG. 1.

A simple instrument for measuring vertical angles may be made by fastening to an upright seven or eight feet high a meter or yardstick approximately at right angles, and suspending over the meterstick a continuous plumbline, equipped with three sliding beads and a bob at each end. To avoid vibrations, the bobs may hang in pails of water.

METHOD.

Discussion: Talk with the children about decorating the walls of the room. Are the walls beautiful in their present condition? What shall be done to beautify them? The children may suggest hanging paper, tinting the walls, decorative painting, etc. Is the decorative painting done in designs by the use of set patterns? Children may suggest the use of stencils in applying the designs to the wall.

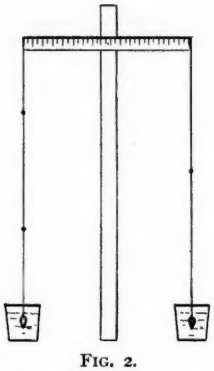
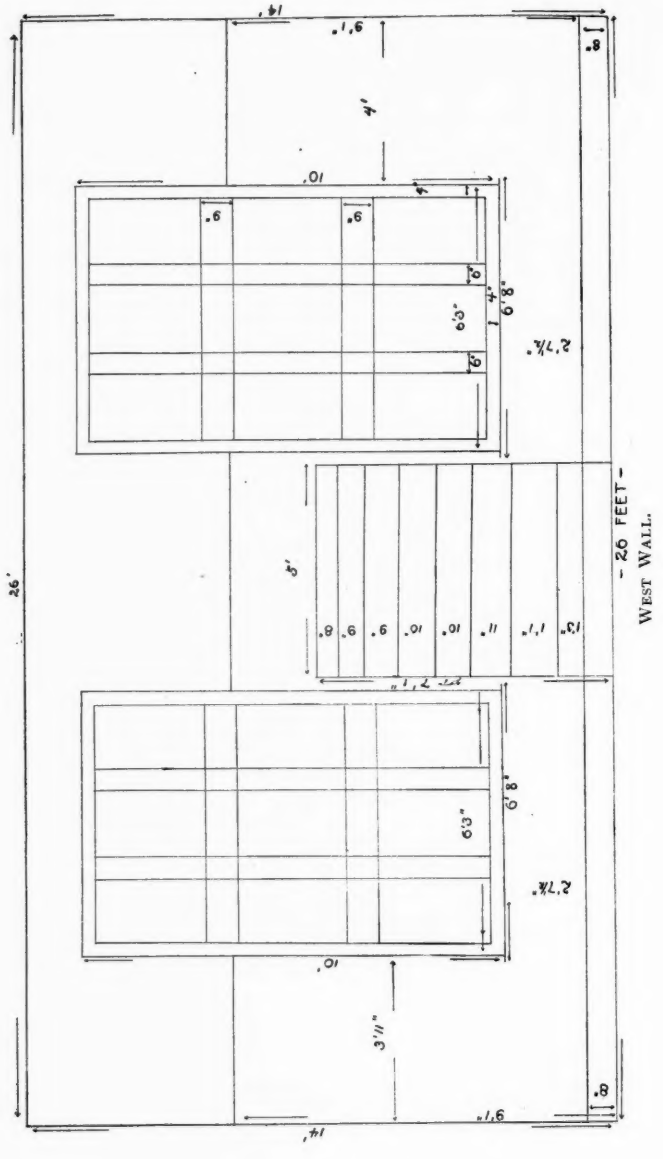


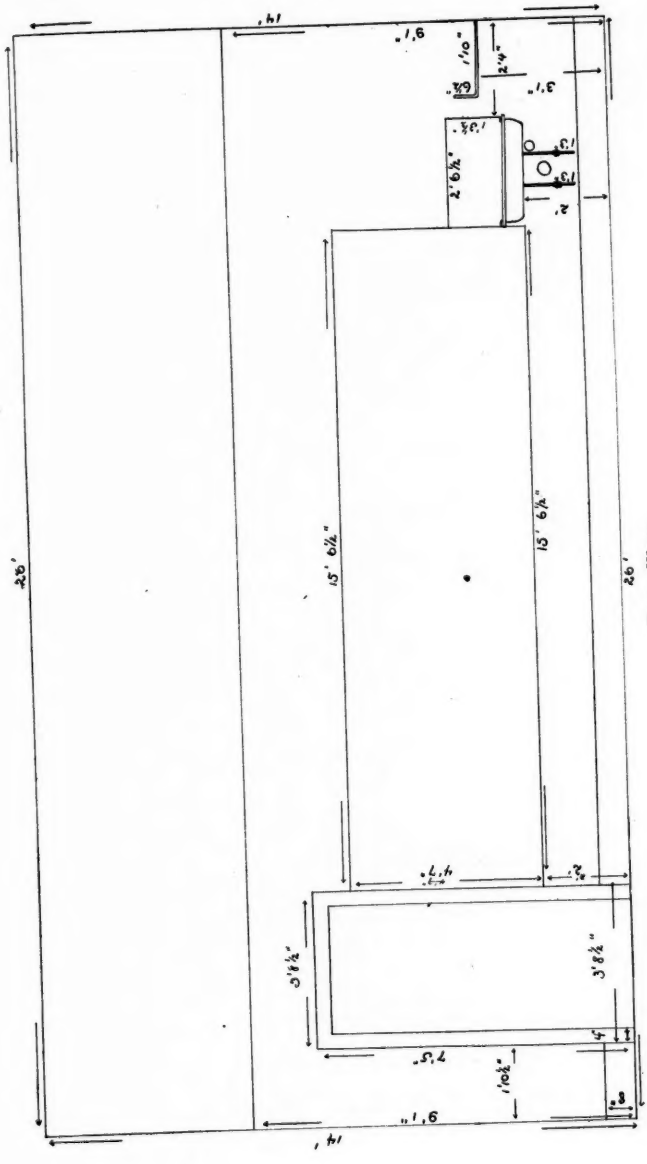
FIG. 2.

How does the designer determine the size and proportions of his designs? Why is it necessary for him to know the dimensions of the walls and of the openings, windows, etc., in the walls, in order to plan his designs? After the designer has the measurements, can he determine the proper size for his stencils and the number of times he wishes to apply the portions of his designs to the walls?

How shall we keep a record of the data? Why not write a list of the measurements and a description of the magnitudes measured? Or shall we draw plans of the walls on a smaller scale and record the data on these plans?

How shall we begin the work?—Discussion: What materials are needed


- 26 FEET -
WEST WALL.


14'
9'1"
1'10"
2'4"
3'1"
2'6½"
1'3"
1'3"
2"
26'
15' 6½"
15' 6½"
26'
4'7"
2"
3'8½"
3'8½"
7'5"
1'10½"
9'1"
14'

EAST WALL.

for our work? Children will suggest the meterstick and the tape. How shall we record our data while making all measurements? Children will probably suggest making a hasty sketch of the plans of the walls, on which to write the results of our measurements. Before beginning the measurements, the children will estimate the magnitudes to be measured, such as the length and height of the walls, the height and width of the windows and doors, the width and length of the blackboard, height of picture molding from the floor, etc. Write these estimates in a list for comparison with the true measurements.

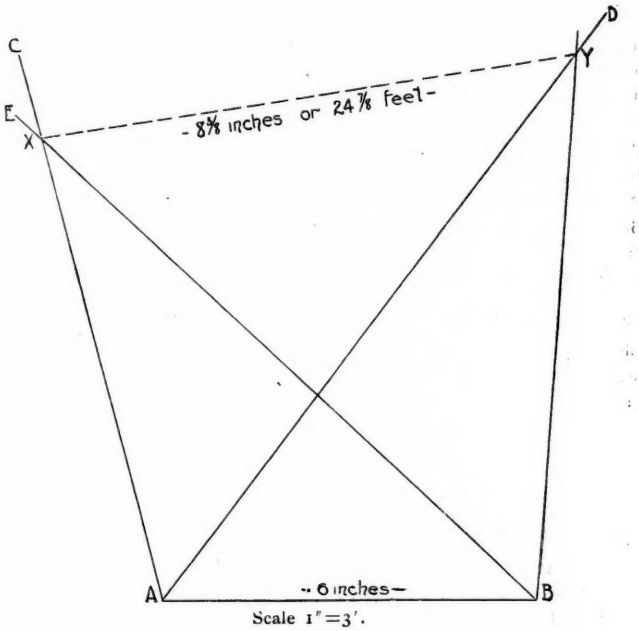
Measure accessible distances.— Discussion: With what magnitudes shall we begin our measurements? The most accessible ones. The children will be divided into groups of two for the practical work. Two children measure length of east wall, width of baseboard, distance from corner to door, width of door, length of lower edge of blackboard, and distance from lower corners of blackboard to the floor. Two children measure height of door at each side, width of door at the top, width of doorcase, height of blackboard at each end, and length of blackboard at the top. Two children take all the measurements of the lavatory, its height from the floor, distance from it to the corner, and the measurements for locating the pipe. Two children measure the length of the west wall, width of the baseboard, distance of one window from the floor at each end of the window-sill, distance from the corner of the room to the window, width of the window, and the length of the window-sill. Two children measure the distance from window to window, width and height of the case of shelves, and distance between the shelves. Two children measure the distance of the other window from the floor and from the corner of the room, width of window, length of window-sill, and the width of both window-frames and the parts of the window-sashes, needed to represent the windows in the plot.

Measure the inaccessible distances.— Discussion: Can any child suggest a way of measuring the length of the wall at the ceiling? If a practicable way is suggested, use it. If not, tell the children that it can be done with the plane-table and alidade. Show how to use the appliances.

With thumbtacks pin a sheet of paper on the drawing board. Place the plane-table so that the alidade points toward one end of the line to be measured. Sight along the top of the board, and bring the plane of the board into the plane of the line to be measured by adjusting the lengths and positions of the tripod legs. Sight along the alidade to the end of the line to be measured, or upper corner of the room. Draw the line *A C*, Fig. 3, on the paper along the alidade. This line will represent an imaginary line from the eye to the corner. Keeping the end of the alidade nearest your eye, on the same point (*A*), swing the other end of the alidade around so that it is sighted into line with the other upper corner. Draw the line *A D* on the paper along the alidade. This line will represent an imaginary line from the eye to the other end of the line to be measured. By means of a plumbline mark on the

floor the point underneath the center of the board. Move the plane-table to a position from which the other upper corner of the room may be seen.

By means of a plumbline mark again on the floor the point underneath the center of the board. Measure the distance from this point to the point underneath the center of the board in its former position. Draw a line ($A\ B$) on paper, to any convenient scale, representing this distance. Place the alidade with the end at this point (B), which represents the point underneath the center



Scale 1″=3′.

FIG. 3.

of the table. Now, sight along the alidade, and direct it first toward one end of the line to be measured, and then toward the other end. Draw lines $B\ E$ and $B\ F$ on the board to represent imaginary lines from the eye, in this new position, to the ends of the line being measured. The points where these lines intersect the lines already drawn will represent the ends of the length of the wall to be measured.

Measure the distance between the intersections to ascertain the length of the line $X\ Y$, representing the length of the wall to be found. This line will be on the same scale as the line $A\ B$. (In my figure, $A\ B$ is 6 inches, allowing 3 feet to the inch, and $X\ Y$ is 8⅝ inches; hence the

length of the wall at the ceiling is $3 \times 8\frac{5}{8} = 25\frac{7}{8}$, or $25\frac{7}{8}$ feet. In these measurements the crude instruments cannot furnish more than rough approximate values. Since the carpenters use plumblines and other instruments with quite as great a degree of accuracy in construction as my method of measuring secures, I discarded, in my own plot, the $\frac{1}{8}$ of an inch discrepancy, and drew my line, representing the upper edge of the wall, as 26 inches, which is the same as the lower one.)

Each pupil should perform this experiment to become quite familiar with the method of measuring such measures, and to realize that he must be careful to draw the lines correctly and to make the intersections definite by using a hard pencil sharpened to a fine point.

Measure the height of the walls.— If no one suggests a way of measuring the height of the walls and the height of the windows, I shall explain the use of the cross-staff (Fig. 1). To ascertain the height of the wall, I stood at a distance of 27 feet, or 324 inches, from the corner of the room. Sliding the cross-stick along the meterstick, I sighted so that one nail-sight ($S\,2$) was in line with the upper corner of the wall, and another ($S\,4$) in line with the lower corner. The cross-stick stood at 21 inches. Since the nail-sights ($S\,2$, $S\,4$) were 11 inches apart, I had this proportion: $21 : 11 = 324 : x$; $21x = 3{,}564$; $x = 169\frac{5}{7}$ inches, or 14 feet $1\frac{5}{7}$ inches, the height of wall. This will be developed by questions in the class. Imagine lines drawn from the eye to those corners. These lines, with the height of the wall, form an isosceles triangle. The distance from the eye to the corner of the room is the perpendicular of the triangle. Draw to a convenient scale a triangle whose sides shall represent the distances from the eye to the top and the bottom of the wall and to the height of the wall. Lead the pupil to see that $21 : 11 = 324 : x$.

MORNING EXERCISES.

BERTHA PAYNE.

		LEADER.
January 2.	Songs	Miss Payne
3.	Current Events	Miss Rice
7.	Gymnastic Practice Order	Mr. Kroh
8.	Stories from Ulysses	Mrs. Thorne-Thomsen
9.	French Games	Miss Ashleman
10.	Stories of Shepherd Life	Miss Mitchell
14.	Birds	Mr. Flint
15.	Types of Courage	Miss Van Hoesen
16.	Nonsense in Literature	Miss Warren
17.	Time	Mr. George W. Myers
21.	Cereals	Mrs. Norton
22.	History Stories	Miss Curtis

23.	Lullabies	Miss Crawford
24.	Favorite Songs	Miss Allen
28.	First German Emigrants in America	Mr. Prokosch
29.	The Jungle	Miss Wygant
30.	Scotland	Mr. Duncan
31.	Songs	Mrs. Bradley

HISTORICAL EVENTS AND BIRTHDAYS.

January 1.	Maria Edgeworth born	1767
1.	Union of Great Britain and Ireland	1801
3.	Battle of Princeton	1777
4.	Jacob Grimm born	1785
6.	Heinrich Schliemann born	1822
9.	Death of Napoleon III.	1873
10.	Schiller born	1759
12.	Edmund Burke born	1729
16.	Act of Union passed in Scottish Parliament	1707
17.	Battle of Cowpens	1781
18.	Proclamation of New German Empire	1871
19.	Robert E. Lee born	1807
22.	Lord Byron born	1788
27.	Mozart born	1756

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